SIMULATED URBAN LAND USE (SULU): AN EDUCATIONAL SIMULATION OF LAND USE PLANNING

By

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TABLE OF CONTENTS

Page

ABSTRACT v

CHAPTERS

I INTRODUCTION 1

Introduction of Problem 1
Origin of Problem 3
Governmental Concerns 3
Educational Concerns 7
Using Computer Simulation to Address the Problem 10
Lack of Geographic Software 13
Place-Name Software 13
Simplistic Human Geography Simulations . . . 14
Lack of Microcomputer Simulations 14
Lack of Simulations Incorporating m,m,l Models 15

II REVIEW OF THE LITERATURE 16

Introduction 16
Educational Software by Geographers 17
Commercial Educational Software for Geographers 26
Simulation and Decision-Making 38
Simulations as Educational Tools 38
Decision Models and Decision Theory in Geography 43

III STRUCTURE OF THE SIMULATION 47

Introduction 47
Preliminary Considerations 48
Rationale for a Simulation 48
Preconsiderations of the Urban Environment 52
Structure of the Simulation 55
Roles in SULU 56
Objectives of the Participants 58
Ways Participants Interact 59
Winning and losing 60
Procedure of play 64

The Environment Within the Simulation 70
Time Interval 70
Location and Map 72
Results of the Simulation 73
Mechanics of the Procedure 74
Computer Equipment. 75
Procedure of the Study 76
Summary 80

IV Statistical Methodology and Results 82

Introduction 82
Sample Characteristics of Study Participants . . 82
Age, Gender and Geographic Background 83
Educational and Employment Background 83
Statistical Methodology 84
Testing Method 84
Has Learning Taken Place? 87
Has There Been Significant Learning? 92
Relationship Between the Average Increase and Questions 93
Relationship Between the Average Increase and Participants 96
Results of Second Study 98
Summary 112

V SUMMARY AND FUTURE DIRECTIONS 114

APPENDICES

A PLAYER ASSETS AT THE START OF SIMULATION 119

B COSTS AND BENEFITS OF THE DEVELOPMENT CHOICES .120

C COSTS AND BENEFITS OF OTHER OPTIONS 122

D PRETEST AND POST-TEST 123

E THE PROGRAM SULU 125

BIBLIOGRAPHY 185

BIOGRAPHICAL SKETCH 200

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The use of microcomputers as an educational technique is a recent and increasingly pervasive phenomenon. Courseware to cover nearly all areas of the curriculum is being offered by many educational software companies. Geography software, though represented, is often of the type to teach names of places and trivial geographic facts. Software teaching geographic dynamics and interrelationships has been a neglected area; there is a paucity of software especially in the area of human geography.

A computer simulation called Simulated Urban Land Use (SULU) is presented as a viable method to teach an area of human geography, urban land use planning. This simulation incorporates multiple decisions, multiple decision-makers, and multiple decision criteria. In SULU, which was designed primarily for advanced high school and college students,

participants are involved in determining what types of development should occur within zones of an urban area and what restrictions, if any, should be placed on growth. Participants act out the roles of those groups that are most involved in making land use decisions, including governmental officials, developers, environmentalists, land owners, and ordinary citizens. Participants try to balance monetary rewards, personal quality of life, and community welfare.

Participants are tested before and after the simulation to determine whether the SULU simulation has caused any learning about geographical land use to have taken place. Four questions are statistically investigated regarding the success of SULU as a pedagogical tool: Has learning taken place? Has the learning been statistically significant? What questions are particularly strong and weak in the simulation? Which groups of participants are particularly strong or weak in their learning from the simulation?

In an experimental test of SULU, results showed that simulation was a valuable tool in teaching geographical land use planning. Significant learning did occur; the average increase in scores across all questions and students was 43.57%. The average number of marks scored out of a total of 19 on the pretest was 3.7 and on the post-test was 11.6. After the simulation, participants were better able to analyze criteria used in making decisions and to see the results of particular decisions.

CHAPTER I
INTRODUCTION

Introduction of Problem

The state of Florida has experienced within the last ten years an explosion of growth of population. It is estimated that the number of people who move to Florida each year is equal to the population of the city of Tampa (estimated 1986 population of 279,000 (Shoemyen, 1987)).

Accompanying this rapid growth has been an increasing concern and awareness about the quality of life for those living in Florida. This concern is not only for unspoiled wilderness areas such as environmentally sensitive offshore islands, coastal areas and wetlands, but also for the environments of the towns and cities where people live. Some of the problems resulting from this increasing population have gained widespread attention in the media: lack of open space or parklands, increasingly congested transportation routes, solid waste disposal, suburban sprawl, inadequate water resources to support the growing population, unrestrained development and lack of funds to support the increased infrastructure needed for the new development.

Awareness and concern about these problems have led to the formation of politically and environmentally active groups. The opinions of these groups run the spectrum from

allowing unrestrained growth, with this groups's argument being that growth brings in badly needed new jobs and new wealth to the state, to allowing no growth at all, with this group's opinion being that too much of the natural and human environment has already been damaged. Those who favor growth point to high unemployment and poverty as reasons for supporting bringing new monies, industry and population to the state. Those who favor non-growth point to the environment of southern Florida with its many problems of lack of fresh water, high congestion and unsightly developments as reasons for restraining or stopping development altogether.

The purpose of this work is to examine the understanding of a sample of first- and second-year college students of the geographical reasons for growth problems that exist today and also to examine their understanding of criteria and decisions that can be used to achieve the type of growth and environment desired. This work includes discussion of a land use simulation entitled Simulated Urban Land Use, or SULU, that was developed for use in this study. This simulation is operational on the microcomputer. It is hypothesized that through an educational simulation on land use in which the students can participate, significant learning about the geographical implications of typical land use policies will take place. The statistical findings of a pretest and post-test dealing with the geographic land use

knowledge of the group of student participants are also presented.

A group of non-geography first- and second-year college students were the participants in this study. The simulation, however, may also be of interest to third- and fourth-year secondary students, citizen groups, governmental officials and planning professionals. Though students may never be in a position as government officials to directly make land use policy, it is of great value that as citizens and indirect policy-makers they are aware of the importance of various land use decisions. In this way participants can make a better evaluation of government officials and can support land use policies that foster the type of environment their own values dictate as being desirable.

Origin of the Problem

The following discussion in this chapter is divided into two parts. The first part examines the origins of the problem that forms the topic of this work, namely educating the citizenry on the topic of geographical land use. Included here is a discussion of the problem as a governmental concern and as a geographic educational concern. The second part addresses specific problems in geographic land use education that exist today.

Governmental Concerns

In November, 1985 a symposium was held for politicians, administrators, and concerned citizens of the city of Gainesville and Alachua County in Florida; the topic

concerned land development of Gainesville and the surrounding county of Alachua. The symposium lasted four hours and involved twelve speakers. The speakers included community leaders, leaders in the local business community, a county commissioner, two attorneys from the Center for Governmental Responsibility at the University of Florida, the chairman of the Visions 2000 committee (a committee charged with making recommendations on long-term policy concerning Gainesville and Alachua county), several environmentalists, and a geographer. In attendance at the symposium were the mayor of Gainesville, most county commissioners and members of the city council, the city and county planners, as well as many local citizens concerned with future development of Gainesville and Alachua County.

The sympathies of most of those present at the symposium were expressly in the direction of regulated growth and land use and the creation of more green space within the city and county. Yet, after three and one-half hours of speeches and discussion from the city politicians and professionals, the workshop was no closer to formulating any positive rational growth policy than at the beginning of the workshop. Almost everyone agreed that the high vacancy rate in housing was alarming, that growth was inevitable but should be controlled, and that the city was in desperate need of more open park and green space. What was clearly missing was a focus on how to effectively address these issues.

One of the last speakers was a geographer. The geographer was able to outline four policies that the county and city could adopt in order to control overdevelopment, rationally deal with the rising growth rate and produce the steady establishment of more open spaces (for a synopsis see G. I. Thrall, 1985a). Toronto, Canada, was cited as an example of a city whose positive environment was a result of instituting such land use policies; Buffalo, New York, was cited as an example of what can happen when growth and development are unregulated and allowed to follow the course of the natural market. Thrall concluded by informing the audience that they had a choice: a decision to accept the proposed four points would lead the market into creating a community surface of land use where people would enjoy living, working, and vacationing thirty years from now just as they do today; the decision to not adopt the four-point policy would lead to urban decay and leap-frog type suburban expansion which has characterized many American cities in the snowbelt and on the West Coast during the past three decades.

The four policies set forth by Thrall were as follows:

a) A moratorium should be established on development when the vacancy rate for various land use categories, such as commercial, industrial, residential, goes above a certain rate, say 3%. When the vacancy rate falls below this critical level the moratorium is lifted.

b) Non-agricultural development that is not adjacent to the already existing urban core should not be allowed. This policy would prevent leap-frog type suburban expansion and shortages of adequate police, fire, and ambulance protection for the outlying areas.

c) A tax of between 10% and 15% to be paid when the classification of a land parcel is changed from agricultural to non-agricultural should be established. Land classification change would be restricted to when a building permit was authorized. The tax monies raised would be spent exclusively on acquiring and developing green or park space.

d) A county-wide agency to oversee the enforcement of the above policies should be established.

The response to this talk was enthusiastic. The ideas were simple and easily operational. Moreover, there was expressed amazement that city and county professionals, including land use planners, had not presented policies that could bring about orderly and efficient development and growth. There was also amazement that the correct decisions or lack of them could lead to such different landscapes as Toronto and Buffalo.

Gainesville, like many other American cities in the Sunbelt, has a problem with urban decay. During the 1970s the average vacancy rate measured in housing stock offered for sale but not sold during any year was 2.7% (Marth and Marth, 1985); according to Gabbard, President of the

Gainesville Board of Realtors, the vacancy rate today is approaching 12%, a figure approaching that of Buffalo with a vacancy rate of 15%. A vacancy rate the size of that in Buffalo is sufficient to provide an incentive for owners to arson their houses for insurance money, which is often greater than the declining market value of their homes. Arson, according to Jim Notestein, an Alachua County Commissioner, is a rising problem in Alachua County. Hence, there is evidence that the Sunbelt cities, by conforming to the same non-interventionist land use policies as those followed in the Snowbelt, are also succumbing to the urban problems of the Snowbelt. Nevertheless, when presented with modest proposals that can alleviate the problem, Gainesville and Alachua County have not been able to institute sufficient land use policies that can control or reverse the degeneration of the landscape.

Educational Concerns

The student of geographic education can then raise several questions concerning this problem of land use management:

a) How can citizens be educated in the principles of geography and land use without enrolling in formal special-purpose geography courses?

b) How can citizens choose which of several spatial policies is best for the present situation?

c) How can citizens experience firsthand the implications, often counterintuitive, of policy decisions before these policies are instituted?

d) How can long-term implications of land use policy decisions be determined?

There is at present an increasing awareness concerning the lack of geographic skills by the American public, and that our schools at the elementary, secondary and even university level are not providing adequate or timely solutions to the problem. Articles on this problem have appeared frequently in the news media, for example Journal of Geography (Helgren, 1983); U. S. News and World Report (Solorzano, 1985); Vital Speeches of the Day (Grosvenor, 1985); Miami Herald (Morgan, 1983). In 1983 several tests were administered by the Dallas Times Herald. The tests included geography questions for twelve-year-old junior high school students in eight industrialized countries of the world; U.S. students ranked fourth among those taking the test, and over 20% of the U.S. students incorrectly identified Brazil as the United States (Joint Committee on Geographic Education, 1984). The University of North Carolina at Chapel Hill administered a basic geography test to over 1,800 of its students, 95% of whom failed the test (Solorzano, 1985). It is a non-trivial idea that due to advances in transportation and communication distances between places in the world are becoming increasingly smaller. Though we do not at present have a true global village, technological advances in transportation and communication have increased the interaction between distant peoples, often with adverse results. Global interdependence of countries' and peoples' welfare is a modern reality. Educators are then justifiably alarmed at the lack of

geographic knowledge, even at the level of place-name facts, that prevails in American schools and the public at large. In order to correctly assess the variety of social, cultural, political and environmental problems that we face today in this shrinking world, citizens must possess basic geographic skills.

What is the basis for the present lag of geographic skills in the United States behind the skills of other, particularly commonwealth, countries? The problem perhaps can be reduced to two primary determinants.

First, in many states geography is not a required subject beyond junior high school. Geography often becomes a minor component of a general social studies requirement, the main emphasis of which is history and government studies. For illustration, in the State of Florida beginning with the academic 1986-7 year, students that graduate from high school must have the following credits in social studies courses: 1 credit in American history, 1/2 credit in world history, 1/2 credit in American government, and 1/2 credit in economics (State of Florida, 1984). Geography is not a requirement for graduation.

Second, when geography is taught in elementary and secondary schools, it is often limited to place-name studies, with emphasis on rote memorization of unassociated facts, filling in empty maps, and drill-and-practice exercises. Many students, and the general American public who remember such geography classes, often have justifiably

a wrong impression of geography and what geographers do. Geographers become identified as merely place-name specialists, or walking gazeteers. The general public is often surprised to find out that geographers are competent not only in documentation and classification, and description of the landscape, but also in explanation as to why the particular landscapes have come about. Once one can give an explanation for something, then often, particularly when dealing with human-created landscapes, one can prescribe sufficient policies that can generate alternative landscapes.

Using Computer Simulation to Address the Problem

The singular solution to the lack of awareness about geography and the lack of geographic skills is to provide information to the public. One effective medium for improving the dissemination of information concerning the discipline of geography is through the present educational system. The research presented here concerns the geographic education of students in the areas of land use planning and the consequences of land use decision policies upon the landscape. The technique employed to achieve this objective is computer simulation.

Simulation, with its special subset of simulation games, is the technique of presenting a model of the particular state of affairs being investigated, which can then subsequently be manipulated by the researcher or players of the simulation game. The model is a simplified

version of reality represented within a condensed time framework. The purpose of a simulation is to analyze the consequences resulting from various decisions. Because it is a model, there are no real risks and harmful consequences attached to trying various alternatives or policies. With condensed time periods, alternative strategies can be employed by the participants, that may in reality require more than a lifetime to become fully revealed. A well-constructed simulation can be used to formulate guidelines for actual decisions.

The microcomputer is an appropriate vehicle for educational simulations. The microcomputer is accessible to a large segment of our society. The capabilities of the microcomputer that make it ideal for use in simulation include its speed, memory, and ease of graphic presentation. Simulations generally require extensive mathematical calculation; large scale simulations that would require a human perhaps a lifetime to calculate, can in a few minutes be solved by the contemporary microcomputer. The microcomputer, because of is graphics capabilities and its abilities to display these graphics in a dynamic manner, is a valuable tool in land use simulations. In land use planning it is useful, especially to the novice, for viewing the region under consideration not only at the present time, but also at sequential time intervals in the future in order to evaluate the suitability of particular decisions. The computer is also readibly available as an educational tool:

not all students have access to or interest in formal geography classes or classes in land use planning, yet access to an inexpensive microcomputer is within the reach of many and interest in microcomputers is very high at the present.

At the same time, there are several drawbacks to microcomputers and geographic-specific software. These drawbacks are listed below, and will be discussed in detail in the following paragraphs and in the literature review in the next chapter:

a) There is a paucity of geographic software for computers;

b) What geographic software does exist is largely limited to the place-name variety where the computer serves only as a page turner or simply for drill-and-practice of large sets of irrelevant facts;

c) Of the few human geography programs, many contain simulations that are superficial and not related to real world land use problems; they are of little value when students must translate learning experience into decisions;

d) Urban planning simulations that do exist are mostly static board games; those few that are computer-related have been written for mainframe computers, not for microcomputers. Many students do not have access to mainframes;

e) There is a lack of sophisticated simulations that take into account that most decisions are made by many

decision makers using multiple criteria (see Chapter II); most problems, including land use development, fall within the simulation category of many decision-makers, many criteria for making decisions, and no clear objective (R. M. Thrall, 1985).

Lack of Geographic Software

There is a scarcity of geographic software for microcomputers. Geography has been generally ignored by the educational software companies; often no geography titles are included in their catalogs.

If geography has not been ignored then it has been given token recognition by being cloaked under the encompassing name of social studies. From a closer look at the social studies programs available, it can be readily seen that few are related to geography. For example, Daetz (1985) in an article in Classroom Computer Learning includes only one geography program in his review of the new, creative social studies programs that are making their appearance.

Moreover, few social studies programs are produced by educational software companies. Electronic Learning (1985) reports that for the month of June, 1985 only 5% of all instructional programs were in the area of social studies.

Place-Name Software

There are a few geographic software programs in the areas of physical geography (mostly software from Great Britain) and cartography (see Carter, 1984), but most

geography programs are place-name geography programs in which students are drilled on the capitals of states, countries of the world, or major landforms.

Simplistic Human Geography Simulations

In reviewing software that may be categorized as human geography, many programs contain simulations that can be considered simplistic: a trivial model of a highly simplified world is assumed and students participate by making choices and decisions that affect the model. Often, however, the simulations are artificial and not related to real choices students will eventually face. A typical example is Agent U.S.A. (Scholastic, n.d.) where students travel around the country applying their geographic skills to disarm a "fuzzbomb" before it fuzzes America. While programs such as these may contain high motivation and interest value, it is unlikely that they will contribute to the student's understanding of geographic processes at work. Furthermore, few are related to the topic of practical land use planning.

Lack of Microcomputer Simulations

There are some land use planning simulations outside the field of geography. None of these simulations, however, exhibit any real complexity on the microcomputer. Several simulations that influenced later urban games were developed in the 1960s. These games are either board games not using computers or games using mainframe computers. Later versions of one popular game, Community Land Use Game or CLUG (Feldt,

1966), used a mainframe computer but only as a calculator to replace the game accountant. In the Guide to Simulations/Gaming for Education and Training (Horn and Cleaves, 1980) all land use simulations that were listed required or were operational only on mainframe computers. No current microcomputer simulations come close to the complexity allowed by these simulations due to their mainframe requirement.

Lack of Simulations Incorporating m,m,1 Models

Simulations can be classified according to the number of decision-makers, the number of criteria used in making the decision, and the number of decisions to be made (R. M. Thrall, 1985). A few simulations of the urban environment and land use exist but are limited to one of the following three classes:

a) the single decision-maker, single criterion case
b) the single decision criterion, multiple decision-maker case
c) the single decision-maker, multiple criteria case.

These simulations are of limited value since most spatial, social, political and environmental problems, including land use planning, fall within the multiple decision maker, multiple decision criteria classes; these classes of decision models have been either neglected or ineffectually addressed (R. M. Thrall, 1985).

CHAPTER II
REVIEW OF THE LITERATURE

Introduction

Although electronic computers have been around since World War II, their use as instructional tools in educational settings has come about very recently. The earliest computers were too large and cumbersome, generated too much heat and required too specialized an environment to regulate this heat factor, were too unreliable, and too expensive to be of practical value to schools. By the late 1970s small computers called microcomputers that could fit on a desk and that could perform 200,000 calculations per second were being produced. Computers then came well within the budgets of most schools and met their performance requirements. By the early 1980s individual schools began purchasing microcomputers in large numbers for classroom use.

The microcomputer is now hailed as a revolutionary educational tool for elementary and secondary schools. Twenty-six states have mandates for some type of computer education; thirty-six states have a full-time computer coordinator; twelve states have computer requirements for candidates for teacher certification (Reinhold and Corkett, 1985).

At the college and university level, many departments, including geography departments, are starting up their own microcomputer labs for educational purposes and relying much less on central university computer facilities. Computers that were once the domain of computer and information science departments are firmly established throughout all university curricula (Fleit, 1987).

Because this disseratation is concerned with the area of automated geographic education, and in particular to the area of operational simulations in the multiple decision maker/criteria area of land use planning, the review of the literature will be divided into several parts. In the first two sections existing educational software programs in geography will be discussed. Since programs written by geographers are significantly different and vary in quality from those written by commercial educational software firms, the discussion of geographic educational software is divided into those written by geographers for geographers and those written by non-geographers for geographers. The third and final section reviews land use and decision-making simulation models.

Educational Software by Geographers

Since the second generation of computer history (1959-1964), computers have been used as statistical research tools (Tomlinson, 1984; Mandell, 1982; Monmonier, 1972). Computers have been used as a tool for mathematical modeling and simulation only since the fourth generation of

computers (1971-present). Computers have been used as educational tools only since the early 1980s; however, a few universities in the late 1960s and early 1970s used computers for some educational purposes.

In the late 1960s and early 1970s geographers began to recognize the value of the computer as an instructional tool (Fielding, 1968; Huke et al., 1969; Monmonier, 1972). At that time, the computer was viewed as an educational method that allowed for individualized instruction. Computer assisted instruction (CAI), also referred to as computer assisted learning (CAL), was a method of programmed learning where the students sat at the computer and read a lesson (tutorial) and/or responded to a series of questions about a particular geographic topic (drill-and-practice); if the answer was correct the computer proceeded to the next question; if the answer was wrong or incomplete the computer branched to a particular part of the program where additional remedial material and further questions to test understanding were presented. Individual scores of correct and incorrect responses were kept on the computer for the instructor. This way the computer could respond individually to each student's areas of difficulty or competence; if extra reading or help was needed in a particular area only those students who needed it accessed it. Examples of such early instructional programs written by geographers were described in the Association of American Geographers' Computer Assisted Instruction in Geography (Huke et al.,

1969) and included topics in physical geography, human geography, and methods (map projections, climate types, energy budget concepts, the political processes involved in the location of freeways, and the correlation coefficient as a measure of spatial association). Many geographers saw the use of the computer in this manner not as replacing lecture or small group discussion but as supplementary to it. By means of CAI students were not relegated just to the tasks of merely taking notes and memorizing required facts, but now were also active participants in the acquisition of geographic concepts. Huke et al. (1969, p. 4) argue that individualized instruction using the computer is meant "to provide situations and materials with which the student may work so that he comes to think as a geographer and is able to take an active part in the process of acquiring knowledge."

As early as 1969 a few geographers recognized that using the computer for programmed instruction where students are limited in their responses to a set of multiple choice answers may not be be using the computer to its greatest educational potential. Skinner, however, argues for using the computer for programmed instruction (Green, 1984). Fielding (1969) comments that those parts of computer programs that posed problems for the student to solve did a better job of conveying concepts than those that only contained drill and practice of terminology or concepts in previously assigned readings. Several programs that set up

algorithms but allowed students to change the value of variables (thus simulating different outcomes) were included at the end of Computer Assisted Instruction in Geography (Huke et al., 1969). For example, Rushton (1969) in his program on agricultural land use patterns allowed students to choose values for von Thunen's land rent model. By changing the values, students tried to generate maps of an agricultural landscape having a desired set of characteristics. Nunley, Sabol and Youngmann (1969) using an analog computer allowed students to vary the amount of current fed into a paper at selected points so that voltage drop as a measure of spatial interaction of inputs could be analyzed. Both of these programs were using the computer for simple simulations where simplified models of the real world were set up and students changed inputs to observe the results.

The use of the computer to present lessons that could be read from an ordinary textbook, that is, using the computer as merely a page turner or to present limited multiple choice questions, was recognized as an inefficient use of computer time (Fielding and Rumage, 1972; Baumann, 1972a). From the student's point of view these programs, though at first generating interest because the computer was used, often became repetitive and boring because only lower level cognitive skills of rote memorization and recall were required. In Computerized Instruction in Undergraduate Geography (Fielding and Rumage, 1972) from the Association

of American Geographers an attempt was made to present more CAI programs that allowed for student input into mathematical algorithms and observation of results from their individualized input. Bell, Frankland and Rushton (1972) allowed students to portray beach beer vendors who must decide on the spatial location of their beer stands in a spatial competition simulation of Hotelling; the parameters of population distribution, differentiation of product, and response time were changed in successive runs to allow for more real world complexity to be gradually introduced into the model. Land Use Game (LUG) (Baumann, 1972a) was a simulation decision-making game where students portray the role of village leaders in a tropical subsistence society; in this game students set up the parameters of initial population sizes, the size of the territory, the percentage of arable land, and birth and death rates. As village leaders they then choose how much land will be planted and in what crops. Ports (Howard, 1972) is a simulation of the growth of ports among competing alternative sites; students choose physical barriers to be placed on a grid map of the landscape. Ricegrow (Huke, 1972) allows students to simulate rice growing farmers who must make twelve different decisions per simulated year. In Aquarius (Kates, 1972) students portray urban water resource planners. In Sovietag (Lindgren, 1972) the students play the Soviet Minister of Agriculture. Whitmore (1972) demonstrates the use of computers for teaching class-interval selection.

Marble and Anderson (1972) presented a large computer program, Landuse, that like Rushton's previous program simulated the von Thunen agricultural land use model. Detailed explanations of the program itself, operating instructions, possible applications and sample runs resulting from parameter changes in the model were included.

These early developments in educational uses of computers in geography were done on mainframe computers. Input was accomplished generally via punched cards and the jobs were run on batch mode. If the equipment was available, students might be able to use typewriter terminals and work interactively. CRT terminals were recommended but very scarce. Computer languages used varied from author to author; they included FORTRAN, APL, BASIC, XBASIC, PLATO, CAL (not the same as computer assisted learning), PL/1, and Lingo. Running the particular program was usually expensive and beyond the means of most departments unless the program was used with only small groups of students.

After the inital enthusiasm for the computer as an instructional tool, little activity in the writing of educational geography computer programs was reported in the literature during the next half decade. This lack of activity was probably due to the large amount of time needed to write educational programs (Degani, Lewis and Downing, 1979) and due to the lack of departmental funds to operate large class computer-oriented lessons.

With the advent of the microcomputer, the price of computers and computer instructional time dropped drastically. Now not only colleges and universities but also even elementary and secondary schools could employ computers in instruction. Educational software firms began making their appearance in the early 1980s; professional program writers now entered the market of writing educational programs (this area will be reviewed in the next section) and have to a certain extent taken over the writing of geographic software.

Computer enthusiasts who were also professional geographers began to present to the discipline the uses of the computer as an instructional tool; this reawakening of interest spread also to New Zealand and Great Britian. The current geographic literature on computers, unlike the literature of the late 60s and early 70s, is now more concerned with two topics: 1) general discussion of the "how-to" use of computers in education and 2) the review of educational software available from software firms. Existing computer programs are usually mentioned only as examples of the general topics discussed. Rarely are original programs written in-house by geographers mentioned in the current literature. For example, in Carter (1984a), which is the only resource or technical paper published by the Association of American Geographers since 1972 that discusses the use of computers in education, only professionally-written software packages are discussed.

In the New Zealand Journal of Geography regular articles appear on the use of the microcomputer as an instructional aid. Among the topics covered are the general use of the microcomputer as an educational tool in geography (Broad, 1983; Forer, 1984; Edlin, 1984; Forer and Owens, 1979); use of microcomputers to teach graphics and mapping (Forer, 1981; Forer, 1982); computer use in multi-media packages (Green, 1985); and computer-based simulation models (Chalmers, Thompson and Keown, 1979).

In the Journal of Geography in Higher Education published in Great Britain the computer is also being promoted as an educational tool (Batty et al., 1985; Reeve, 1985; Shepherd, 1985). In the United States, the Journal of Geography has published articles on a similar note (Churchill and Frankland, 1980; Stoltman, 1983; Groop, Dodge and Manson, 1985; Lewis, 1986).

In the early 1980s microcomputers began to make their appearance in elementary and secondary schools; at this time also, new educational journals dedicated solely to the topic of microcomputer use in schools, for example Electronic Learning and Classroom Computer Learning, began to make their appearance. These two new journals along with The Computing Teacher were the important journals for teachers who were interested in how to put this new technology to work in their classrooms. However, few articles were published in these journals on the use of microcomputers in geography. Within the last two and one-half years Electronic

Learning has published two articles on the use of computers in social studies, neither of which was specifically related to geography; they did however, have a comparison of several geography software programs in one issue (Rosenzweig, 1986). In the last four years only five articles have appeared in Classroom Computer Learning on the use of computers in the teaching of social studies; none of these articles specifically concern geographic uses. However, two paragraphs giving reader suggestions on using the computer in place-name geography were published during this time period. Similarly, in The Computing Teacher in the last four years only two social-studies-related articles have appeared, only one of which was somewhat related to geography.

In summary, interest in the educational uses of computers in geography began in the late 1960s and ran high until 1972. Original in-house programs were the norm and a geography program exchange was set up at Michigan State University for the dissemination of these programs. By the mid 1970s enthusiasm began to wane due to monetary cost of running the programs on expensive mainframe computers and time costs in writing these programs. With the advent of microcomputers, interest again revived in the late 1970s and early 1980s. However, this time the enthusiasm was directed toward using professionally written software available from software companies. The literature contained general articles on educational use of computers and reviewing of

software that was appearing on the market. Educational journals dedicated to the use of the new technology in the classroom began to make their appearance in the early 1980s; there was, however, still a paucity of articles related to the educational uses of the microcomputer in geography.

Commercial Educational Software for Geographers

During the 1960s and 1970s most geographic educational software was developed by geography instructors. Indeed, software companies as such did not exist until after 1969 when IBM announced the "unbundling" of their products; previous to this time software was provided by the computer manufacturer as part of the price for a computer. Beginning in the 1980s when the large market of elementary and secondary schools as software users developed, new educational software companies began to appear. In this section the commercial software available to geographers specifically for instructional purposes will be reviewed; geographic information systems software development has been reviewed elsewhere (Tomlinson, 1984).

When microcomputers first appeared in elementary and secondary schools, few teachers could program and those that could had little time to write their own software; they came to rely on software companies to provide them with educational programs. Geographers also began to rely more on the software firms for the same reasons. However, software has until recently not been of the quality, quantity or subject matter needed by geographers. Social studies,

including geography, is an area where there is a paucity of programs. In the January, 1987 issue of Electronic Learning the twenty top publishers who sell over half the educational software to schools in the United States are listed. Among these top twenty that list no geography software in their catalogs are Davidson, Houghton Mifflin, Spinnaker Software, Springboard, IBM, and Southwestern. Those that list fewer than ten geography programs are Scholastic, Sunburst, Broderbund, MECC, Encyclopedia Britannica, Hartley, and Milliken.

One major software firm, Sunburst, has no geography (or social studies) software programs listed in its 1985-1986 catalogs. Sunburst did, however, add three geography programs to its 1987-1988 catalog, two of which are just databases of facts and information that could be used in the social studies classroom. The third program, Standing Room Only (Biro et al., n.d.), is a simulation modeling population growth. Two pages of the 56-page Opportunities for Learning 1985 catalog are devoted to social studies; of the fourteen social studies programs available, only two, Africa (Educational Activities, 1983a) and Time and Seasons (Rand McNally, 1984b) are expressly devoted to geography; another two, Choice or Chance (Rand McNally, 1984a) and Annam: A Developing Country (Educational Activities, 1983b) overlap the areas of history and geography. Scholastic Inc. devotes only one page of its 76-page 1985-1986 catalog to social studies; only one program, Agent U.S.A. (Scholastic, n.d.), is related to

geography. In Scholastic's 1987-1988 catalog two other database software programs were added. Conduit's 1986-1987 catalog contains two programs that are geographical in nature: Diffusion Game (Lovelock and Weinberg, 1981), a simulation of diffusion, and Demo-Graphics (Population Dynamics Group, 1983), which is a database that also allows some primitive hypothesis testing. Cambridge Development Laboratory's new 1987 catalog has a few physical geography programs listed under Science. Imperial International Learning catalog and the Mindscape catalog each list two geography programs. Educulture, J. Weston Walch, Inc. and Aquarius People Materials Inc. have one geography program in each of their most recent catalogs. BLS and Mindplay list no geography programs in their latest catalogs.

Studying the educational software review collections published by various educational institutes also reveals a lack of good geographic software. The Educational Software Selector (T.E.S.S.) (1985), a directory of over 7000 software programs from over 600 producers, published by the EPIE Institute, lists 125 geography-related programs; only 10 programs are simulations and none are on the topic of land use. The Florida Center for Instructional Computing's 1986-1987 review collection entitled @Micro (1986) evaluated over 200 titles of which only 2 were in geography. Project SEED, developed by the Southeastern Educational Improvement Laboratory, has reviewed over 200 titles, 3 of them geography. The 1987 Educational Software Preview Guide (1986), developed by Educational Software Evaluation

Consortium, evaluated 22 geography titles in its collection of over 600. The MicroSIFT Courseware Evaluation (1985) of the Northwest Regional Educational Laboratory lists 10 geography titles in its reviews of over 400 titles.

The majority of the educational geography programs that do exist are place-name geography programs. Intellectual Software's 1984 20-page catalog contained two pages on geography; of the twelve United States geography programs and the six world geography programs offered, all were place-name drill-and-practice software programs. In the 1983-1984 Directory of New Educational Computer Software (Classroom Computer Learning, 1983) over twelve hundred packages were listed; thirty-six were geographic in content, twenty-three of which were of the place-name variety. One program could be argued to be related to land use: a simulation related to the Oklahoma Territory in 1889 (Edupro, n.d.). GeoData, a company dedicated to the manufacture of software for the instruction of geography, reports that all its software is of the drill-and-practice format. The March/April 1985 issue of Journal of Geography lists twenty-one software programs of possible interest to geographers; forty-three percent are place-name programs, six are simulation, and none are land use simulations. In the September/October 1985 issue of Journal of Geography eighteen geographical software programs for the IBM PC are listed; all of them are place-name programs. Only two pages of the 56-page 1984-1985 Opportunities for Learning software catalog (1985) contain social studies software; four could

be considered geography and one is a simulation, but not a land use simulation. In the May/June 1986 Electronic Learning comparative review of geography programs, Rosenzweig reviewed only place-name drill-and-practice and database software. In the November/December 1987 issue of Classroom Computer Learning, Eiser and Salpeter listed some of the better-evaluated geography software; this included a few programs that taught mapping skills, several databases, but mostly programs that taught only place-name or geography trivia.

Method software, such as cartographic skills software, statistical methods software, electronic spreadsheet software (the manipulation of rows and columns of data on computer) and data base management software (filing and management of large amounts of data on computer), has recently been added to the plethora of place-name geographic software. Software review sections of geographical journals have reflected this. For example, the January/February and March/April 1986 issues of Journal of Geography have reviews of map-making software packages and geographic information systems. The software reviews begun in 1985 in American Cartographer are all on map making packages, statistical packages, and general computer-aided drafting packages. Over 90% of the software reviews in The Professional Geographer are on method software.

Often software listed under Geography is no more than tool software such as electronic spreadsheet software and

database management software that allows students to store, present and analyze data. Hometown: A Local Area Study (Active Learning Systems, n.d.) has a misleading title and is merely a database management program. The Maps series from Adam Cobb & King (n.d.) combines computerized maps and a small database of facts. Some database programs are ready-made and contain geographic data which the students can use--a sort of almanac on computer. Examples of these are One World Countries Database (Active Learning Systems, n.d.); MECC Dataquest: The Fifty States (Minnesota Educational Computing Corporation (MECC), n.d.); World Geography, Cultures and Economics (Scholastic, n.d.); Countries of the World Database (Grolier, n.d.); United States Database (Sunburst, n.d.); and North America (Sunburst, n.d.).

The professional geography journals and resource publications have begun including sections on software review. These journals include Professional Geographer, New Zealand Journal of Geography, Journal of Geography, Journal of Geography in Higher Education and American Cartographer. The American journals have generally reviewed only physical geography software or methods (cartography, statistics, digital analysis) software. The Association of American Geographers resource paper Computer Mapping: Progress in the 80's (Carter, 1984a) lists many cartographic software programs for the microcomputer (e.g. Isopleth Map-Making Package, Mapware, Supermap, Topographic Mapping, Micro-Map

II). Professional Geographer has reviewed mapping packages (Atlas Amp (Foote, 1985), Contur (Goodchild, 1985), Golden Software Mapping Package (Lewis, 1985b)), methods software (Samp (Tweedie and Stadler, 1985), Lokate (Bell, 1985), Add A Stat (Sheskin, 1987), Statplan III (MacLachlan, 1987)), general geography concepts software (Unlocking Map Code (Pillsbury and Pillsbury, 1985), Time and Seasons (Pillsbury and Pillsbury, 1985)), physical geography (Shore Features (Lai, 1985), Weather Fronts (Hobgood, 1986)), and simulations (Choice or Chance (Pillsbury and Pillsbury, 1985), Diffusion Game (Eagle, 1985)). The Journal of Geography has reviewed physical geography packages (Water & Weather (Vuicich, 1984), Weather Fronts (Smith, 1984), The Hurricane Tracker (Skaggs,1984)), methods software (Varigraph (Foust, 1984), Demo-Graphics (Rushton, 1984), Topographic Mapping (Hanley, 1985)), and one place-name package (Geography Scramble (Carter, 1984b)). The Journal of Geography in Higher Education, a British publication, has likewise concentrated on physical geography software (Laurillard, 1984) and methods software (Topographic Mapping, CAC/Apple, and Applepips (Unwin, 1982)). The American Cartographer has recently begun a column reviewing method software related mainly to map-making and statistical skills (Desktop Information Display System (DIDS) (Groop, 1985)). Geographic simulation software that exists is often unrelated to decisions students will face in the future. For example, in Agent U.S.A. (Scholastic, n.d.) students must

disarm a fuzzbomb; in the award-winning Where in the World is Carmen Sandiego? (Broderbund, 1984) students are detectives tracking criminals throughout world cities using The World Almanac; and students are spies looking for Dr. X, a jewel thief, in The Spy's Adventures Around the World (Polarware, n.d.). Students use geographic clues to locate a downed satellite in Satellite Down: Rescue Adventures in Geography (Focus Media, 1985). Students play explorers like DeSoto or Hudson in Choice or Chance (Rand McNally, 1984a) or Amundsen or Scott in Computer Adventures: South Pole/Atlantis (Sunburst, n.d.) or early navigators searching for a city of gold in Geography Search (McGraw-Hill, n.d.). Students are adventurers in Treasure Hunter (Grolier, 1984) which is designed to teach reference rather than geographic skills. In Discover the World (Hartley Courseware, n.d.) students portray sailors in the 15th century off to discover the Orient. Oregon Trail (Minnesota Educational Computing Corporation (MECC), 1985) is slightly related to geography in that it presents upon request updated maps as student pioneers blaze a trail across the United States. In Immigrant (Morrison and Walters, 1985) students play Irish immigrants in Boston during 1840 to 1860; some of their decisions are geography-related such as the decision of where to live. These latter programs, however, are more related to history than geography.

In those simulations that are related to real world situations, few concern practical land use planning. In

Change Agent (Conduit, n.d.) and Diffusion Game (Lovelock and Weinberg, 1981) students play "change-agents" in hypothetical agricultural communities; political decisions are made in a developing country in Annam: A Developing Country (Educational Activities Inc., 1983); transportation planning is the subject of Motorway Route (Longman, n.d.) and pollution control in Slick! A Conservation Game (Blackwell, n.d.). The simulation game United States Energy, Environment, and Economic Problems (Conduit, n.d.) is related more to public policy decisions and how they relate to energy supply and the physical environment than to land use planning. Crosscountry USA (Didatech Software, 1985) concerns the shipment of various commodities across the country. The Other Side (Tom Snyder Production, 1985) deals with global conflict resolution and concerns political science rather than geography. SIMPOLICON: A Simulation of Political and Economic Development (Daetz, 1983) concerns agricultural and resource management in a developing country. A geopolitical simulation, Balance of Power (Mindscape, n.d.) requires students to play the United States or the Soviet Union as they vie for power in a nuclear age.

A recent addition to the growing number of simulations is Urbanization: The Growth of Cities (Tom Snyder Productions, n.d.). In this simulation, students must make decisions about growth, taxes and the common versus personal good as the community grows. There are several significant

differences between this simulation and SULU, the latter program being the one developed in this dissertation. The community in Urbanization is a hypothetical one that is just beginning to experience growth; SULU presents a real community as it exists now with its real land use pattern, population and vacancy rate. In Urbanization students must choose at the beginning of the simulation whether they favor growth over stability and low taxes and common good over personal gain, and they then must remain with this decision throughout the game; it is used as a criterion by which they are scored; in SULU there is no scoring; participants may change their minds and allegiances to goals. The number of rounds to be played is preset at five rounds in Urbanization; in SULU many or few rounds may be played. In Urbanization, goals for individual players are predetermined; as students are assigned roles they must try to reach these predetermined goals; in SULU only roles are assigned; actors in the simulation must think carefully about their individual goals and respond to those of other players. Unlike the end in Urbanization where scores are presented for each player, the final result of SULU is to present the city as it will appear if it continues along the trajectory decided upon in the simulation. Urbanization is aimed at intermediate and junior high school level; SULU is aimed at beginning college students.

Because of the lack of geographic educational software other than place-name and method software that relates to

particular areas of geography, geographers recently have begun to once again write and publish their own software. Forer (1985) also cites the lack of distinctively localized software as a reason for the return to in-house writing of software. This in-house software has covered all areas of geography, not just physical and methods. Hustings by Forer (n.d.) is a spatial voting pattern simulation. Four mapping programs developed by Churchill and Frankland at Middlebury College are SGNMAP (n.d.), PWRMAP (n.d.), CMAP (n.d.), and ISOMAP (n.d.). The Department of Geography at Canterbury University in New Zealand has developed two urban geography graphics packages: Mobility and City Form (n.d.) draws urban areas and a cross sectional graph of the density of development given user-specified mobility levels; Competition for Shoppers (n.d.) allows the users to locate several retail outlets and shows subsequent allocation of households to each particular store. Four interesting geographic programs developed under a grant from the Schools Council project are Puddle (Longman, n.d.), a simulation of the effects of water on land, Growth (Longman, n.d.), an urban growth simulation of a small market town from 1901 to 1981, WELF (Longman, n.d.), a program on urban social deprivation, and Mine (Longman, n.d.), a simulation that allows the user to portray a prospecting company exploring and mining underdeveloped areas. The Environmental Simulations Laboratory at Southern Illinos University has begun the development of a series of simulations for

environmental geography: Gravity (1985) familiarizes students with the basic principles of gravity; Waterbud (1985) introduces the concepts of the Thornthwaite water budget using graphics; Runmod (Prowse and Yazdani, 1985) simulates a four-parameter runoff model to simulate the catchment processes. The MEP/GAPE Project (Midgely, 1982) is a series of eight geography programs developed in Great Britain covering such topics as transportation networks, hydrological cycles, coastal erosion processes, slope measurement, settlement decisions of sixth-century farmers, and urban growth. Several new programs developed by geographers and available from the Michigan State University Center for Cartographic Research and Spatial Analysis are Socioeconomic Patterns (Groop and Manson, 1982), Economic Rent (Mehretu, 1982), Sampling Distribution of Sample Means (Pigozzi, 1982), Land Use Competition (Campbell, 1982), a simulation of the impact of herding and farming on marginal farm areas, Data Classing (Groop, 1982), Weather and Climate (Dodge, 1982), and Landforms (Winters and Rhoads, 1982). Carstensen from Virginia Tech has written Mentmap2 (1984), an interactive program that examines the mental maps of individuals. Williams and Fotheringham while at University of Indiana developed Simodel (1984), a software package that uses the maximum likelihood estimation method to calibrate spatial interaction models. The Operational Geographer, a Canadian publication, has begun a software exchange; programs available are generally methods programs, for

example, distance matrix generators and spot symbol mapping programs.

From this review it can be surmised that few land use software programs exist. Those that do directly address the issue of land use are 1) related to agricultural land use (Simulation of Land Use Patterns (n.d.) by Rushton, Landuse (1970) by Marble and Anderson, Land Use Competition (1982) by Campbell); 2) related to urban land use (Growth (Longman, n.d.) from the Schools Council project in New Zealand, Urban Land Use (Midgely, 1982) from the MEP/GAPE Project in Great Britain, and Mobility and City Form (n.d.) from the Department of Geography, Canterbury University). Of these three land use software packages Urban Land Use is not a simulation. Growth, though a simulation, concerns only one town in an historical setting of 1901-1981. Mobility and City Form relates only high, medium and low mobility of residents to urban growth.

Simulation and Decision Making

Simulations as Educational Tools

Simulation as an instructional technique has been around for centuries. The game of chess was one of the first games used to simulate war between two nations with the chess pieces representing the strength of two competing armies. Tournaments during the Middle Ages were another form of simulation that taught knights what to expect during warfare. During the late eighteenth century and the nineteenth century Prussia refined war simulations: Der Neue

Kriegspiel was a sophisticated board game using a map that was divided into thirty-six hundred squares and played with pieces that actually represented particular military units like infantry and cavalry. Actual topographical features were taken into account during the play (Inbar and Stoll, 1972).

Simulation underwent a dramatic change with the invention of the electronic computer: one of the reasons the first electronic computer, the ENIAC, was developed during World War II was to handle the large amounts of data needed to simulate tank, submarine and airplane warfare. War simulations that could only be feasibly handled by computer continued even after the end of the war. Sophisticated mathematical models of gaming and simulation, notably the work of von Neumann and Morgenstern (1944), contributed greatly to the theory of gaming and competition at this time.

Social scientists, particulary economists, and business theorists became interested in simulation during the 1950s and 1960s. Their highly quantitative models could be translated into simulations with relative ease (Maidment and Bronstein, 1973). Other areas of social science such as sociology, geography, especially human geography, and psychology, though more difficult to quantify because of their human orientation, soon followed. Workers in these latter areas of social science found simulation particularly rewarding because of an inability to subject their human

studies to a strictly-controlled laboratory environment, possible only in the physical sciences; with simulation, however, an infinitely complex set of causes of events or behaviors could be clustered into a set of more manageable proportions. Models or rules of behavior that might be hidden behind the elaborate yet distracting complexity of the real world could be discovered.

During the 1970s a great number of simulations were introduced and used in business and academic social sciences. Werner and Werner (1969) listed hundreds of simulation games, and more recently Horn and Cleaves (1980) list over fourteen hundred simulations in education.

Shortly after social scientists became interested in simulation gaming, social science educators began to appreciate the value it might have in the classroom. Guetzkow, who was familiar with war games, began to use simulation in the political science classroom to teach international relations (Guetzkow, 1963); and Bruner (1970) argued that for students to actually understand another people, they must immerse themselves into the society and problems of the culture being studied. Taylor (1971) was one of the first to introduce gaming to urban geography. Gamson (1972) used a self-authored game called Simsoc to teach an introductory social psychology course; METRO (1965) and METROPOLIS (1967) developed by Duke at the University of Michigan and Feldt's CLUG (1966) (Community Land Use Game,

also known as Cornell Land Use Game) were widely popular for teaching urban land utilization.

Despite these examples of college-level gaming, simulation first became widely popular at the secondary and elementary levels. At this time a trend away from lecture and rote memorization of facts led educators to seek out a new method of teaching decision-making skills to students and to foster in students the understanding of social and political dynamics; simulation seemed aptly suited to this purpose. Many simulations appeared on the market at this time (Maidment and Bronstein, 1973).

Simulations may be classified into three categories according to their mode of operation: pure computer simulations, human simulations, and human-computer simulations. Pure computer simulations are generally not for educational purposes but used in research and technology. Examples of these include simulations of tank, plane and submarine warfare developed during World War II.

Human simulations and human-computer simulations are predominantly used in teaching, with far greater emphasis on human simulations than human-computer simulations. CLUG is an example of a human simulation where there is no computer involved. The simulation was carried on by means of a playing board and calculations were assigned to two people, the game operator and the community tax assessor. The disadvantage of human simulations is that play is resrticted to one scenario, in this case an imaginary place represented

by a 14-by-14 grid of squares. Introduction of real world phenomena such as buildings and natural features such as rivers and mountains requires a time-intensive redrawing of the playing board. Another disadvantage of CLUG is that two players do not participate in the decison- making because they are strictly involved in handling the many calculations of the game. The great advantage of human simulations is that players are required to interact just as they are in the real decision-making.

Human-computer simulations can combine the best of pure computer and pure human simulations. Because of the computer's dynamic element, different scenarios can be quickly generated that represent a real place rather than a contrived symmetric grid. Tedious computations can be done quickly and accurately by the computer, thus relieving a player or players from the burden of this task and allowing all to participate in the simulation. Computers can also quickly calculate and display long-term results.

Several human-computer simulations related to urban concerns were developed for use on mainframe computers. A simulation called Acres (pidot, 1973) allowed players insight into land development and environmental impact on a 15-by-15 grid of imaginary land. Blackberry Falls (Jansen et al., 1975) simulates a New England town of thirty-five hundred residents and uses the computer to calculate cost impacts, returns on investments, and to store and retrieve information during the play. City Model (House, 1970) also

uses a hypothetical city made up of a 25-by-25 playing grid. METRO (Duke, 1965) uses a real city as its base, Lansing, Michigan, where players vie for resources for their particular projects, such as road development or improvement of schools. None of these simulations, however, use the microcomputer to generate the results of the decisions being made in the short and long term future.

Human-computer simulations in an educational setting of elementary and secondary schools have not become widespread due to, until recently, lack of computers in school settings and lack of software simulation programs. Simulations that generate maps of results of decisions are also non-existent.

Decision Models and Decision Theory in Geography

Decision models and decision theory are new to geography (Thrall, G. I. 1986). R. M. Thrall (1985) gives a taxonomy for decision models based upon three characteristics, and the following discussion is based upon his classification scheme:

1) n_1 - the number of decision makers,
2) n_2 - the number of decision criteria,
3) n_3 - the number of decisions to be made.

Each of these three classifications (n_1,n_2,n_3) can take on two types of values, either '1' or 'm' (many). Thus eight possible combinations exist:

(1,1,1)
(1,1,m)
(m,1,1)
(m,1,m)
(1,m,1)

(1,m,m)
(m,m,1)
(m,m,m)

The first pair of combinations, the (1,1,1) and (1,1,m) imply a single decision maker and a single decision criterion. The major portion of decision theory belongs in this classification, including linear programming; geographical applications include Osleeb and Ratick's (1983) work on transportation, Norton and Solis' (1983) work on land uses and G. I. Thrall's (1985b) work on relocation and reservation incomes.

The second pair of combinations, the (m,1,1) and (m,1,m) models involve many decision makers with a single criterion and one or several decisions to be made. The one criterion is usually the accumulation of money. Most game theory, including the general categories of games known as prisoners' dilemma and fair allocation, falls within this category. Included here is the classic game theory work of von Neumann and Morgenstern (1944) and the geographic work on development incentives of Zeller (1984). Zero-sum games where one player wins at the expense of others losing are also included in this category.

The third pair of combinations, the (1,m,1) and (1,m,m) categories, involves a single decision maker but multiple objectives or criteria (Keeney and Raiffa, 1976). Risk analysis is allocated within this class. R. M. Thrall (1985) comments that this class is relatively more complex than previous categories because criteria are multiple but

must be mapped onto a scalar measure. Often non-monetary criteria like quality of life or improvement in the environment are put into monetary terms; there are obvious drawbacks to this. One of these drawbacks in this type of model is that values are placed into a model framework by the person writing the model rather than at the time the decision is made and by the decision maker. O'Sullivan (1980) in his work on suburban warfare and G. I. Thrall (1982) in his work on the consumption theory of land rent are geographic examples of this category. The work of Clark and Smith (1982) and Clark et al. (1984) on search behavior of households and the work of Golledge and Wrigley (1985) on spatial choice behavior may also be included in this category.

The last pair of combinations includes the (m,m,1) and (m,m,m) class. This class involves multiple decision-makers and multiple decision criteria. This class encompasses a wide variety of social and political problems, such as environmental legislation from the local to the international level, aid to low income persons, foreign aid, and international trade agreements. Equitable land use policies at the local level are also included in this category.

This area of decision models is not well represented in the geography literature. In other disciplines, R. M. Thrall (1985) claims that too often multiple criteria are forced within the framework of monetary criteria alone or

just ignored because they cannot be quantified. This leads to inadequate and inviable solutions. At this last level of multiple decision-makers and multiple decision criteria, game theory becomes extremely complex ("The importance of being nice, retaliatory, forgiving and clear", 1985); yet it is within this level that many geographic problems lie.

CHAPTER III
STRUCTURE OF THE SIMULATION

Introduction

This chapter discusses the materials and methods employed in carrying out the study on urban land use using the computer simulation Simulated Urban Land Use (SULU). (The actual statistical results of testing the effectiveness of SULU are described in Chapter IV.) The discussion follows four major divisions: preliminary considerations, the simulation structure, the spatial and temporal environment of the simulation, and the mechanics of and observations on the actual study and testing.

In the first division, general preliminary considerations will be discussed in two subsections. The first subsection will focus on the rationale for using a simulation situation as an educational medium. The second subsection will introduce some preconsiderations that must be taken into account when trying to characterize the urban environment in a simulation.

The second division will contain several sections that deal with the structure of the SULU simulation. The first subsection will deal with the participants in the simulation and their respective roles. The second subsection will discuss the objectives of each of the participants; recall

that this is a multi-objective decision making model. The third subsection will relate the ways that theparticipants interact. The fourth subsection will relate how participants win or lose. The fifth subsection will elucidate the procedure in the land use simulation.

The third division will discuss the spatial and temporal environment within the simulation. The first subsection will briefly describe the time interval involved. The second subsection will focus on the geographic location to be used in the simulation. The third subsection will describe the results of the simulation focusing on the graphics to be obtained.

The last main division will deal with the mechanics of the study. The first subsection will describe the computer used as the vehicle for the simulation. The second subsection describes the actual procedure of the simulation that was used.

Preliminary Considerations

Rationale for a Simulation

The method of simulation has been chosen; well-constructed simulations are an excellent educational tool for several reasons. First, simulation allows students to be active participants in the learning process. Unlike lecture where students may be just passive listeners, simulation allows them to become part of the decision-making process. Learning takes place not in a static environment but by being involved in and seeing the results of decisions. Learning is done by the discovery method;

learning is not just the rote memorization of facts. This can be best summarized by a Chinese proverb:

I hear and I forget
I see and I remember
I do and I understand.

Second, simulation allows students to make decisions without risks inherent in real decision making. Once land use policies have been instituted it is very difficult if not impossible to backtrack when undesirable results occur. Many results, like the pollution of the environment, may be irreversible. In simulation even negative consequences can be studied and used as positive feedback in more effective decision-making. At the same time, the results of reckless decision-making are clearly evident. A simulation like SULU can clarify to decision-makers what the results of particular decisions may be.

Third, in simulation, different strategies can be employed and the results observed in order to choose the most effective strategy. Society, unlike chemicals in a laboratory, cannot be tested in a controlled environment holding all but one factor constant; human interaction is much more complex. In simulation, the same situation can be observed several times and the specifications changed slightly each time for variety and to evolve more viable results. This can also result in participants being more focused in their aims and the methods to achieve these aims.

Fourth, because of active student involvement, methods and rules and data are actively used, not just taught. The

learning of abstract ideas and concepts becomes more concrete in a more realistic setting. A simulation like SULU can involve the use of actual population and spatial data with real locations.

Fifth, simulation can be fun and will often motivate even indifferent students. Highly motivated students can be further stimulated and slow students can become involved and achieve success that often eludes them in a regular classroom situation. Instruction can thus become truly individualized.

Sixth, simulation encourages and rewards creative thinking. Too conservative solutions usually contribute to a decrease in the welfare of all or some of the players while innovation generally leads to an increase in overall player welfare.

Seventh, simulation fosters organization and cooperation. It generally requires that students work in an organized manner in order to achieve their objectives. It fosters cooperation and compromising with other participants in order to achieve the mutual benefit of all. Often only by cooperation or collusion can the simulation be completed or particular policies carried out. In order not to lower their quality of life and monetary assets, participants in SULU have to compromise and to a certain extent sublimate personal values to societal values.

Eighth, the time framework in a simulation is speeded up, so participants can see not only the short-term reults of their decisions, but also long-term effects. Often

positive short-term reults mask the extremely negative consequences that may arise even years later. A simulation like SULU can show long and short-term results in a few minutes.

Ninth, simulation contributes to the participant's social education. It is one of the most fundamental of learning experiences. Infants and children learn personal and societal values through games (Papert, 1980). Simulation fosters the development of decision making skills and strategic thinking, the understanding of cause and effect, and the understanding of the dynamics of social, political and geographic processes. A simulation like SULU can make participants aware of spatial processes and what decisions are needed in order to make a community a desirable one in which to live.

Tenth, simulation overcomes potential polarization of teacher and pupil. Students are no longer being lectured to nor necessarily fear the retribution of the instructor or bad grade that accompanies the failure to learn enough of the proper information. Instructors, because they do not participate but act merely as observers, can be divorced from the simulation and from the antagonism arising from students who lose (fail). In fact, losing in a simulation generally carries no stigma but serves as a vehicle for better understanding and possibly more creative solutions for the next time. The instructor is then free to be there only to explain the rules and assign the various roles and physical location of the participants.

Preconsiderations of the Urban Environment

In developing a simulation like SULU that models the real world, several properties of the urban environment should be considered (Kibel, 1972). Most urban decisions, though they may be non-spatial in nature, have spatial consequences. For example, though voting for a particular person may seem non-spatial, the decisions an elected official makes affects the geography of the community: the governmental officials determine zoning laws, approve different types of construction in certain locations, and appoint city planners who subscribe to distinct philosophies of what the community should look like spatially. In SULU spatial effects interact with non-spatial happenings.

The philosophies of residents of the urban environment, except for the smallest of preplanned communities, usually differ. Some in the community may believe that growth of the community and exploitation of the natural resources of the area are most desirable. Others have no-growth, hands-off attitudes. Still others may have opinions that lie between these two extremes. Participants in SULU must operate within the wide spectrum of value systems (multiple objective criteria) that exist in the role being modeled; those decisions that positively affect some will have negative consequences on others.

Urban decisions have many consequences. The decision to locate a major shopping mall outside the city limit and in a particular area of town will cause transportation reorientation in that area; other shopping areas may be

abandoned because of the attractiveness of the new mall. The mall may directly affect the city, yet the city has no control over it because it is located outside the city limits. It would be impossible to follow all the consequences of all decisions. SULU deals with specifically spatially oriented consequences in the community as a whole, the macrolevel, and to the consequences to indiviuals.

In reality there is not an unlimited source of funds for all projects that are desired to be undertaken. This is also true of the microlevel of individuals. In SULU the resources of the community and the participants in the community are limited. Compromises and tradeoffs will have to occur or else the city or individual participant will run out of money. Certain decisions will have to be choosen over perhaps equally worthy alternative decisions.

Some decisions are ultimately made by one or a few groups that have authority to make the decisions. Only governmental representatives make decisions directly on the use and zoning of land; citizens make decisions indirectly by trying to influence governmental officials in open forums and by reelecting them or not. The participants in SULU who are not the governmental officials or the city planners are therefore the secondary actors and the governmental officials and city planners are the primary actors. In voting for or against a certain land use decision, the votes of the primary actors have more weight than the votes of the secondary actors. Kibel (1972) notes the current growing interest in the collective influence of certain sectors of

secondary actors upon the primary decision makers. SULU also allows secondary actors to influence the primary actors in their final decisions (multiple decision-makers).

Despite the infinite variety of human characteristics, certain groups react to particular situations in relatively predictable ways; for example, environmentalists will react differently than will land developers. Because of societal, economic, and political rules, morals and goals, a certain amount of stereotypical behavior can be observed in the primary and secondary actors. Simulations, including SULU, exhibit this stereotypical behavior in its actors.

The urban environment is dynamic, not static. People continually migrate into and out of the community. People die and people are born. Neighborhoods, as a result of certain decisions, may stagnate, decay and be abandoned. New neighborhoods in different spatial locations may arise to replace them. Industries may move in or out of an area. Market areas may be lost or new ones gained. SULU takes into account the population growth aspect and how it affects the spatial nature of the community; at different points in the simulation new population figures are presented that affect the number of residential locations and therefore the vacancy rate in the area of study. SULU also takes into account how decisions on areas that may not be concommitant with the community can affect the community in the long run.

Barriers to city growth exist. Communities have rivers or ravines running through them; they may be bordered on one

side by a large body of water or a barrier such as a mountain range. (Though in certain places such as Hong Kong and China bodies of water or mountains have not been deterrents to growth.) Barriers may also be human structures such as highways, land bought by speculators, zoning laws about building on flood plains or in certain high-fire-risk forested areas. SULU takes into account existing barriers in actual locations; the participants in SULU must deal with these barriers, both legal and physical.

Urban decisions have long-term effects. Decisions made today influence the appearance and health of the community many years into the future. SULU handles both short-term and long-term effects of land use decisions. Maps of the community under consideration are generated for various time periods.

Not to decide is to decide. In urban communities, not to make important land use decisions at the right time can also lead to the demise of the community. Waiting too long to make a decision on land use may result in large population growth and poor land use becoming progressively worse until an irreversible condition exists; at this time the whole community loses. In SULU the population rate is continually growing; problems not addressed affect each participant's qualtity of life throughout the simulation.

Structure of the Simulation

In designing a simulation it is important to strike a balance between modeling the world in a realistic and meaningful fashion and keeping the simulation simple enough

for participants to understand the process and yet gain insight from it. The following section will discuss the design of the simulation used in the study. The first subsection will present the actors in the simulation. The second subsection will discuss the various objectives laid out by the designer of the simulation and those objectives fashioned ad hoc by the participants. The third subsection will indicate the ways participants can and did interact. The fourth subsection will discuss winning and losing in SULU. The fifth subsection will detail the procedure of the simulation.

Roles in SULU

Roles the participants portray in this simulation are limited to those representing groups who would have interest and input in land use planning. They include

1) elected governmental officials
2) city planners
3) land developers
   a. small developers such as local builders
   b. large development corporations
4) environmentalists
5) farmers and other large land owners
6) small business owners, for example those that would own a small store such as a grocery store or stationery store
7) big business, for example representatives of major companies such as IBM or major developments like a shopping mall
8) low-income citizens of the city
9) middle-income citizens of the city
10) high-income citizens of the city.

Each of the above roles can be represented by as few as one person; however, more interaction, stategic planning, and enjoyment can take place if there is more than one participant per role or team. The role will suffer

especially if one person is shy and is hesitant about contributing an opinion to the other participants. For example, in the actual study the person chosen for the environmentalist, a role that may have a highly differing opinion than many of the other participants, was shy about giving an opinion and said almost nothing until the later rounds. A maximum of four participants per team for a total of forty participants is recommended so that the interaction does not become too complex and inefficient. If there are less than ten persons available for the simulation it is suggested that various roles be combined; for example, an outgoing or imaginative individual can be choosen to represent all the citizens, or the roles of government official and city planner can be combined. It is suggested that not less than five or six participants be involved in the simulation. If there are more than ten participants, but not an even multiple of ten, these extra persons can be scattered throughout the roles at the discretion of the teacher; this will not affect the vote count because there is only a team, not individual, vote and each team's vote value has been predetermined.

The government official is to be the leader of the simulation and should be an outgoing individual who is reasonably comfortable with keying data (very small amounts are required) into the computer. This person or team calls for votes and types them into the computer, calls the end to discussions, recognizes turns for discussion and controls the flow of the simulation.

Objectives of the Participants

Objectives of each participant are similar yet also different depending on the particular role. Objectives are similar in that each team wants to obtain the highest level of welfare possible; they are dissimilar in that each team probably has a different opinion as to what type of land use will bring about this high level of welfare.

Each participant or team has a set of assets to begin the simulation corresponding to what might be the actual welfare of that person in relation to others. These assets are in the form of money and quality-of-life credits (see Appendix A). All teams start off with $100 except the low-income citizen who begins with $50 and the high-income citizen who begins with $150. Also, all teams begin with six quality-of-life credits in the form of happy faces on the computer screen except for the low-income citizen who has five quality-of-life credits and the high-income citizen who has seven quality-of-life credits. It should be stressed to the participants that these values are only meaningful in their relation to each other and not in their actual face value. Also, participants need to be reminded that these assets only have to do with a person's welfare in relation to land use policies and not the myriad of other social, economic and spiritual aspects that make up each person's actual welfare.

Quality-of-life and money assets within the simulation are often related to the actual land use decision made. For example, if participants vote in favor of developing a

parkland, all gain one quality-of-life credit due to increased quality-of-life, yet all lose $5 to pay for the cost of park development; the land developer loses one quality-of-life credit because a large parcel of land is no longer available for development of, say, housing. A list of costs and benefits for each type of land use choice is given to each team at the beginning of the simulation (see Appendix B). Thus, each team's strategy to increase its overall assets may be very different from other teams' strategies.

In the study, participants not only were cognizant of their need to increase their money and quality-of-life credits but also were imaginative in including in the discussion more personalized needs in order to convince others to accept their way of thinking. These personalized objectives were very realistic in that they mimicked arguments often heard at government council meetings. For example, the small-business person argued that opening more small businesses was healthy for the community as a whole; the low-income citizen argued for park development as a place where all children could play; the developer subtlely threatened that if impact fees were imposed the community would see her unwillingness to cooperate in future growth and development.

Ways Participants Interact

During the simulation each group of participants discusses and determines its stategies during the entire run of the simulation. Before any vote all teams are given the

opportunity to voice their opinion as to a particular land use proposal and to try to convince others to accept their way of thinking.

In the actual study participants also devised more clandestine means of negotiating. Though there was no means built into the simulation for bribing others to vote a particular way, teams several times bargained with others in vote trading tactics (if you vote for my proposal I will vote for your next proposal).

During the discussions, a map of the area is readily available to be displayed on the monitor for participants to consult (Figure 1). The asset table is also available (Figure 2). The map was often used to debate the pros and cons of various sites for land use proposals.

Winning and losing

SULU is a non-zero-sum simulation. A zero-sum simulation is one in which a winner can only emerge at the expense of others losing, such as in Monopoly where only one person is the winner and winning occurs when that person accumulates all the wealth of the other participants. In SULU there is no obvious point at which the simulation necessarily ends, because no one participant emerges as the winner. Play can continue for many or only a few rounds to be decided at the discretion of the instructor.

Each team's objective is to maximize its own welfare, which may or may not be at the expense of others and the community. No participant or team is necessarily trying to sabotage another participant or group, yet this may be the

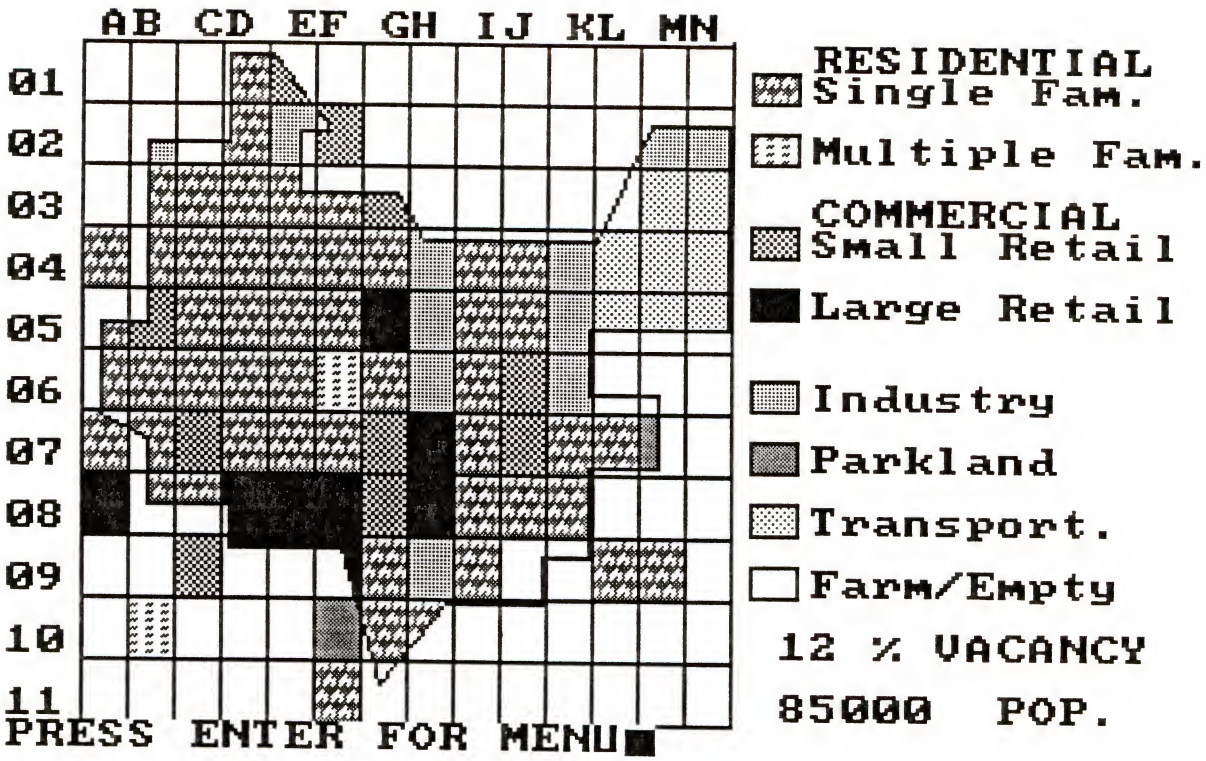

Figure 1. SULU Computer Map Showing Land Uses.

PLAYER ASSETS

$: MONETARY ☻: WELFARE

GOVERNMENT OFFICIAL	$ 100 ☻☻☻☻☻☻	SMALL BUSINESS OWNER	$ 100 ☻☻☻☻☻☻
CITY PLANNER	$ 100 ☻☻☻☻☻☻	BIG BUSINESS	$ 100 ☻☻☻☻☻☻
LAND DEVELOPER	$ 100 ☻☻☻☻☻☻	LOW INCOME CITIZEN	$ 50 ☻☻☻☻☻
ENVIRONMENTALIST	$ 100 ☻☻☻☻☻☻	MIDDLE INCOME CITIZEN	$ 100 ☻☻☻☻☻☻
LAND OWNER/FARMER	$ 100 ☻☻☻☻☻☻	HIGH INCOME CITIZEN	$ 150 ☻☻☻☻☻☻☻

PRESS ANY KEY FOR GAME MENU

Figure 2. SULU Computer Screen Showing Player Assets.

inadvertant result of each team attempting to maximize its own welfare. Participants must make the decision on what is the maximum welfare they want and how much they may be willing to compromise for the welfare of others and the community. Participants in the study regularly voted for proposals that would maximize their own personal welfare.

Since this is a multi-objective simulation each participant or group may have their welfare maximized by different criteria; hence, the environmentalist's welfare may be greatest if there is no growth and development, whereas the developer's welfare may be maximized only if there is much growth and development.

Also, every groups's welfare is also interdependent with the welfare of the entire community: if the community goes through a period of decay, then everyone's welfare is lowered. For example, in SULU the development of a large retail business will mean more jobs for the community, an increase in everyone's welfare, but will also mean more traffic congestion and noise which lowers everyone's quality of life. Welfares are relative to one another: a high-income person may not feel his/her welfare is high enough if a poor person's welfare is only a few points less.

Results continuously appear in the figures printed in the asset table that appears at the end of each round and whenever participants call up this screen. Maps show the community in the short-term (five years) and long-term (twenty years). For example, in the short-term the welfare of the community may be quite high, but in twenty years the

welfare of the community may have dropped significantly due to abandonment of certain areas of the city or increased pollution. In summary, each participant must decide whether welfare has been increased or decreased, and whether the community in which they must reside has gained by way of the change in the environment.

Procedure of play

At the beginning of the simulation a menu is displayed on the computer screen that indicates to the participants their choice of actions (Figure 3). These choices include

1. displaying the city map
2. displaying the participant assets
3. displaying the land use choices
4. displaying other nondevelopment options
5. voting
6. redisplaying the instructions
7. ending the simulation.

Generally the simulation begins with the teams familiarizing themselves with the map (Figure 1).

Each group of participants confers and decides upon its preferred land use choices to be proposed in various locations in the city. The map and and list of assets are available to be displayed upon the computer at any time for participants to view and consult when determining their strategies of land use. Seven land use development options are available; these are

1. single-family dwellings
2. multiple-family dwellings
3. small retail and professional (office; bank; restaurant; neighborhood plaza)
4. large retail or government (shopping mall, government offices, university)
5. manufacturing industry
6. parkland
7. transportation network (airport; railroad station).

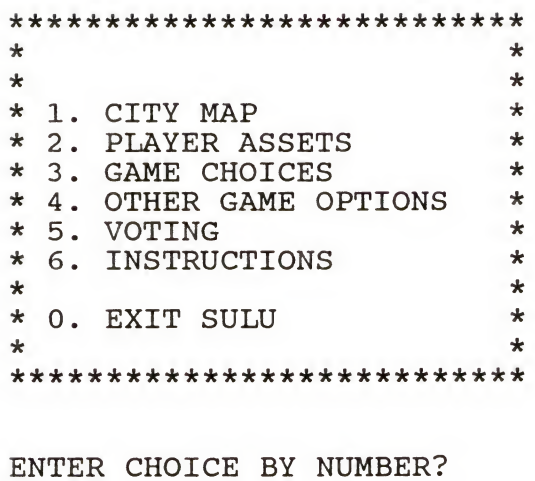

Figure 3. SULU Computer Screen Showing Game Menu.

Other nondevelopment options are also available; these options are not available to the participants, however, until three rounds have been played. These are

1. tie development to the vacancy rate
2. impose impact fees on development
3. charge a fee for any development to be set aside in a park fund for later development of parks.

A list of the costs and benefits of each of the seven development choices and the three nondevelopment choices are given to each participant either before the simulation starts or after the third round has been completed (see Appendices B and C). The team chooses the options it decides would be optimal in increasing its welfare. After each group has decided its strategy (some groups may have no initial strategy and decide to wait until later to make any proposals) one group takes the initiative and proposes some action for a particular parcel of land using the displayed map for reference. For example, a proposal may be made to locate a small business at cell A1 (Figure 4). Discussion ensues on the pros and cons of the proposal and site chosen. Though the site may be changed during the discussion, the proposal may not be changed until a vote is taken.

All participants in SULU vote on land use proposals. Weights on their votes are established before the actual simulation begins. Vote weights have been predetermined in the simulation; each team gets a vote weight, of two except the government official and city planner, who get a vote weight of three, and the low-income citizen, who gets a vote weight of one. Hence, participants have voting power

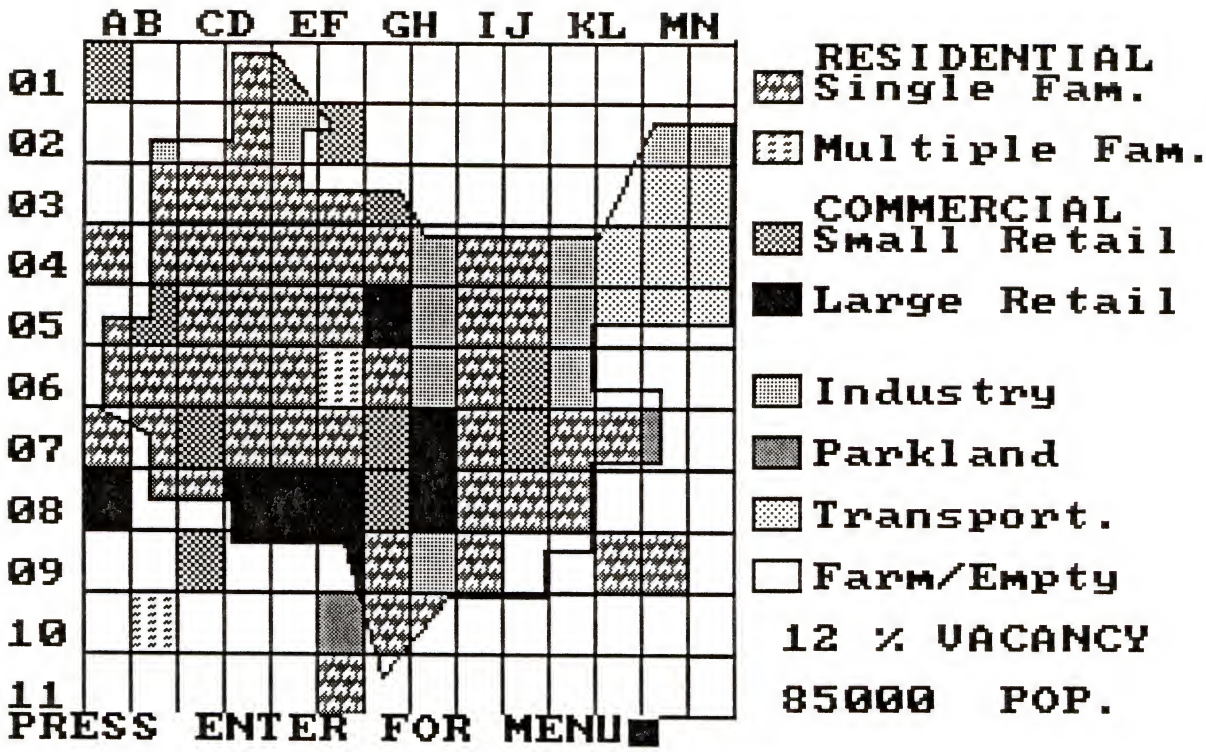

Figure 4. SULU Map Showing Small Business in Cell A1.

proportional to their degree of influence. All groups can be influenced to change their opinions and thus their vote by any or all of the other groups through discussion.

After each group has had a chance to voice its opinion or when the government official calls a halt to discussion, voting takes place on the proposed choice. The government official types each group's vote into the computer (Figure 5). The results are tallied by the computer because voting weights are unequal, and results are incorporated on the map (Figure 4) and asset chart if the proposal, was passed. After voting, another team has a chance to make its proposal followed again by discussion and voting.

Once three rounds in the simulation have been played, it may be assumed that a certain passage of simulated time has occurred. Several adjustments are made to each participant's assets. Participants receive an increase in money due to wages earned; all participants receive $10 except the low-income citizen who receives $5 and the high-income citizen who receives $15. Participants pay taxes of $2 each. Population increases by 2% and the vacancy rate adjusts to this new population increase (vacancy rate falls since new population means more housing occupied). Quality of life decreases by one credit because increased population often means inadequate roads and other infrastructure. Also, if any team's money assets have fallen below $15 the quality-of-life credits decrease by one; if any team's money assets are a multiple of $200, then the quality-of-life credits increase by one. The computer calculates taxes and

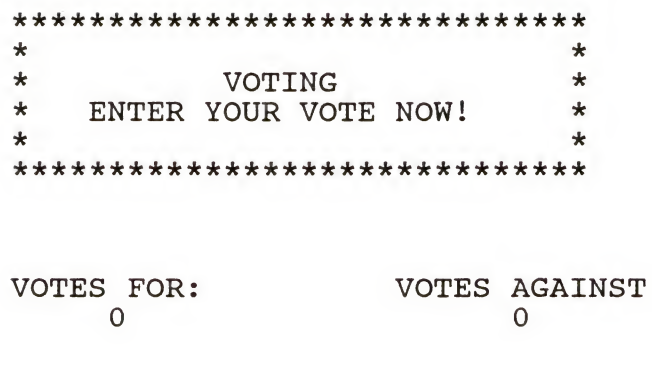

Figure 5. SULU Voting Screen.

collects them, adds to each participant's resources, and also calculates the new vacancy rate. All results are displayed on the screen on both the map and the asset chart.

Successive rounds of the simulation ensue. The simulation continues until the general concensus is to halt or the instructor calls a halt. As in the real world there is no built-in end, so in SULU there is not an end. The government official chooses the end option from the menu on the screen monitor. The participants may then see their city as they have created it and the long-term city twenty years in the future.

The Environment Within the Simulation

Time Interval

A simulation allows time to be compacted; several rounds of a simulation may represent many years in the actual life of an urban area. SULU is not intended to have a one-to-one correspondence with actual time. Rather the intent is to show the decison makers in the simulations how their land use decisions affect the welfare of persons living in the community and how the community will actually change given those decisions. The computer at the end of the simulation generates a map of what the city will look like five years and twenty years from the reference time, given the decisions that have been made in the simulation.

Population is increasing or decreasing due to people inmigrating and outmigrating. During the run of the simulation the population continues to grow or decline

depending on growth rates in the city based on actual data. Different scenarios are produced by different rates of growth such as negative growth (the urban area is steadily losing its population), no or slow growth, medium growth or rapid growth. This can be easily programmed into the simulation depending on the actual population growth or decline at the time. The actual vacancy rate and population can also be changed in the program.

Chance occurences, such as a major industry deciding to open a new branch in an area, arise in the real world and so also in the simulation. Unpredictable events are introduced periodically and randomly into the simulation after three rounds. There are four chance occurrences programmed into SULU. The first occurrence is that the federal governemnt takes away previously available funds for new highways and reallocates these funds to another area unrelated to land use; all participants are assessed for continuing road maintenance. The second occurrence is a fire at a local industry that causes polluting smoke over the entire city; because many areas of the city must be evacuated everyone's welfare (quality-of-life credits) decreases. The third occurrence is that local industrial pollutants sink into the aquifer; all participants are assessed for clean-up costs and everyone's welfare decreases. The fourth occurrence is a grant by a local philanthropist who leaves a sum of money for buying parks; everyone's welfare increases and the park fund assets increase. As these occurrences arise, the participants are

informed of them; the participants then chose whether or not to respond to them by changes in their strategy. In any case, the computer adjusts the money and quality-of-life assets of all participants in response to these chance occurences.

Location and Map

Unlike most simulations using a spatial environment, SULU does not begin with an empty symmetrically shaped area to be filled in, for example a square playing board divided into smaller squares. An outline conforming to the city of Gainesville, Florida is used (see Figure 2). Parts of surrounding Alachua County, Florida are also included. (Though the actual setting of SULU is Gainesville, Florida, many of the concepts presented could apply to any city in the United States.)

When a land use plan is decided upon, the citizens must contend with a preordained outline of county and/or city and with structures both natural and human-made that are already in place. It is rare that citizens can migrate to an empty place and begin building an urban environment. (Brasilia and Canberra are notable exceptions to this.) Major geographic and human-made features of the particular location that could constitute barriers or catalysts to different types of land use are indicated on a graphic display of the location on the computer. Major features on any map include bodies of water such as rivers, lakes and oceans that border the location, and mountains and ravines. Land uses that are already in place, also constitute major

features and include such uses as housing developments, industrial sectors, parkland and business sectors.

The map is divided into 154 cells of equal size; cells are indicated by an eleven-by-fourteen grid overlaying the map. Besides considering the size limits of the color monitor on the computer, the size and therefore the number of cells were determined by balancing a small enough number to be practical and nonconfusing to the participants and yet a large enough number to allow flexibility in choice of areas to develop. Cells are numbered with letters and numbers similar to electronic spreadsheets with which participants may be familiar.

A choropleth map is drawn using cells that are color and pattern coded to the particular land use of that area. (Though current IBM-PC technology limits the pixels on the color graphics screen to only four colors, a cell of size sixteen by twelve pixels can accomodate 4^{192} different patterns.) It is usual for cartographers to generalize when drawing maps in order to represent a large area on a much smaller map; in SULU since each cell represents a much larger actual area, the most representative land use for that cell was coded on the map. The resulting choropleth map gives an accurate generalized representation of the actual area used in the simulation.

Results of the Simulation

The result intended for this simulation is that decision makers should be able to see short and long-term community consequences of their decisions, that is, the

costs and benefits to individuals and to the community resulting from certain land uses and what the community will look like years in the future if certain policies are instituted. Therefore the output of the simulation should match this result. Two outputs are given in this simulation; one is ongoing, the other occurs only at the very end of the simulation.

The ongoing results are displayed on the map (the various land use patterns and the vacancy rate) and the asset table (each team's money and quality-of-life credits). As decisions are made throughout the simulation the computer recalculates the appropriate figures and displays them at the participants' request. Maps at the five-year and twenty-year mark constitute the one-time result. These maps show how certain areas of the community have been utilized and those areas that may be abandoned and in a state of decay. Via these final maps participants can determine whether their decisions resulted in a city that is what they consider to be amenable to live in, and if not, how decisions can be altered.

Mechanics of the Procedure

The materials and methods used in the study are discussed here. The first subsection will focus on the computer equipment used to operate the simulation. The second subsection will detail the procedure of the actual study. Some interesting observations on how the participants played their roles is also included.

Computer Equipment

The microcomputer has been chosen as the vehicle for this study for several reasons. First, the simulation requires several calculations and a large amount of data about the map will have to be stored. Calculations to be performed include each group's money and quality-of-life credits, the vacancy rate, collection of taxes and dispersal of wages, the voting results and the new population figures. Items to be stored besides the above-mentioned items include original and changing color patterns for the various areas of the city. To do these calculations and many changes to the map and charts by hand would be time-consuming and become a major task for the participant who is assigned the role of simulation operator. The computer can do the calculations quickly, eliminating the drudgery of this task for the simulation operator. The computer can also redraw the map with new patterns in less than five seconds. The calculations done by the computer are ensured accurate whereas human calculations may be prone to error. Because of the computer, the calculations are secondary, allowing all to participate in the simulation.

Second, since the time to do the calculations is decreased because of high computer speeds, many more rounds can be played and different strategies tested by the various participants. A meaningful simulation can be achieved in one class period.

Third, many people are drawn to and fascinated by computers. Simulations and games on computers are widely

popular and generate enthusiasm. Results obtained by computer are sometimes given more credance by some people than results listed in a lecture. Results obtained through an enjoyable activity will probably be remembered for a longer period of time.

IBM-PC computers and compatibles using an 8088 microprocessor and a standard color graphics adapter card were chosen for this simulation for several reasons. IBM-PC and compatibles are widely available. They hold 42.6% of the business and professional market. Though holding only about 20% of the overall educational market (Infoworld, Nov. 4, 1985), they are steadily increasing their hold in this area (Ranney, 1986). At the college level, the level at which this study is aimed, IBM leads in microcomputer installations, holding a total of 48% of the market (Fleit, 1987). (This 48% figure does not include compatibles; Zenith, which makes compatibles, holds an additional 7% of the total market of college-installed microcomputers.) A Zenith microcomputer that was IBM-PC compatible and had a color monitor was used for this study.

IBM and compatibles also have a very good resolution. This higher resolution is needed to accurately represent a map of the study area. (In medium resolution graphics the user has available a 320-by-200 pixel screen.)

Procedure of the Study

The study was held during a regular four-hour class period. (A discussion of the participants is given in Chapter IV.) The study began with a short introduction by

the instructor lasting five to ten minutes. In the introduction the instructor briefly explained to the students what a simulation is and that this simulation would involve land use decisions that would be made by themselves as actors in the simulation. The instructor did not name any roles the participants would portray because that may have influenced the results of the pretest (discussed below).

After this brief introduction, a short pretest was given to the participants. The pretest included short answer questions about the participants' previous knowledge of the vocabulary of land use, the persons who play a role in real world land use planning, the positive and negative externalities of certain types of development and considerations in locating various types of land use (see Appendix D). The participants took about fifteen minutes to complete the pretest.

The instructor then gave a more detailed explanation of the simulation and use of the computer. Roles, as discussed on page 55, were assigned to the various students in the class, although the instructor could have opted to have the students themselves choose their own roles. In assigning the roles, emphasis was placed on participants actually playing the role assigned and trying as far as possible to take on the personality of the particular role.

Several reference sheets that would be helpful during the simulation were handed out to the students (see Appendices A and B). These included a list of the beginning assets of each actor in the simulation; a list of choices

for development that the students could decide upon; a list of the costs and benefits, both in money and quality-of-life credits resulting from each of these choices. Since other nondevelopment options were not allowed to be chosen until three rounds had been played, a list of the cost and benefits of these options (see Appendix C) were not distributed at this time, but only after the required three rounds had been completed.

Next, voting was briefly explained. It was noted that several actors' votes would count for more than others and that one actor's vote would count for less than the others. Furthermore, it was noted that voting had to be done on the computer so the computer could properly tally the differentially-weighted votes. No indication was given as to whose votes counted for less; this was discovered as the simulation progressed.

At this point participants proceeded to the computer to begin the simulation. Ten rounds were completed in approximately one and one-half hours. After one round with some initial guidance on the procedure by the instructor, the participants felt relatively comfortable with the simulation and required little information from the instructor during the rest of the simulation. The student playing the role of the government official led the simulation along, calling for discussion on proposals, halting discussion, and typing the votes into the computer.

During the simulation the participants chose to locate a variety of land uses including several small business

facilities, several parks, a transport facility, a large retail business, a multiple-family dwelling and a manufacturing industry with its dumpsite. Of the additional options (Appendix C) the participants chose to have impact fees to help pay for the cost of infrastructure in future development.

Several chance occurrences programmed to arise randomly during SULU happened, including a major polluting fire in the city, a spill of toxic chemicals into the aquifer, and a windfall gain of a large sum of money for a park development. The last occurrence caused the participants to agree to developing a park.

Much discussion arose during the simulation concerning the locations of particular land uses under consideration; often the discussion on where to possibly locate a development was more lengthy than what type of development to locate. Participants gave strong consideration to the reasons for choosing a particular site including how accessible the development would be (e.g. was it too far into the county, near major residential or governmental areas), whether the development would cause negative externalities to surrounding land uses (pollution, noise, traffic congestion), and whether a similar competing land use was already located nearby. Several times the location choice was changed during the discussion of reasons to have a particular type of land use and before the participants chose to vote.

It was interesting to observe that without exception participants fell into truly playing the role they were assigned. For example, the government official wondered aloud if the way he voted would affect his being re-elected, even though there were no elections during the simulation itself. Several other participants voiced concerns over imposing impact fees; they thought the developer may decide to stop building, and thus the growth of the area would be halted if these fees were passed. The participant portraying the low-income citizen voiced repeated concern about job opportunities for himself and recreational facilities for his children. Almost all participants expressed frustration during the simulation at not being able to significantly lower the vacancy rate which was high at the beginning and which periodically affected everyone by lowering their quality-of-life assets.

After one and one-half hours the simulation was voluntarily terminated. A final post-test identical to the pretest was administered to the participants to check if learning had taken place. This post-test took about fifteen minutes to complete. Statistical results of the tests are discussed in detail in Chapter IV.

Summary

Simulation was chosen as the technique to present the topic of land use planning to college level students because simulation actively involves students in the learning process. In the SULU simulation the participants portray the roles of those people who would be actively interested in

political life: government officials, business persons, land owners and concerned citizens. Participants interact via planning of, discussion of, and voting for alternative land uses in various areas of the city and county presented to them on the computer as a choropleth map; the land uses include residential, businesses, manufacturing, transportation, and parks and recreation. The objectives of the participants or teams are to support those land uses which they feel will maximize personal welfare, which includes money and quality-of-life, and to maximize the welfare of the community. As in real life there is no built-in end to community land use planning.

CHAPTER IV
STATISTICAL METHODOLOGY AND RESULTS

Introduction

This chapter discusses the statisitical methodology used in assessing the performance of the SULU program. Since the purpose of this work is to extend the existing methodology of simulation into the area of instruction with the objective of increasing understanding of the processes that bring about changes in urban form, the problem to be tested is whether SULU increased students' knowledge of the spatial implications of particular land use policies. To test whether the simulation was successful several standard statisitical tests were performed that are described in this chapter. First, a detailed description of the subjects who participated in the study is given. Second, the statistical tests used and the results obtained from each are described. An additional experiment was also performed; summary results and comparisons to the first study are discussed at the end of this second section.

Sample Characterisitcs of Study Participants

The next two subsections will discuss the sample characterisitics of the participants involved in this study. First the age, gender, and geographic characteristics will be presented. This will be followed by information on their educational and employment backgrounds.

Age, Gender and Geographic Background

The participants in this study were the students of an introductory computer class at Lake City Community College, Lake City, Florida. The ages of the participants ranged between 19 and 32. The mean age was 23 and the median was 22. There were 4 females and 3 males participating.

The participants were of a wide range of geographical backgrounds and experiences in regards to places of residence. All except two of the participants gave their permanent residence as Columbia County, Florida . One was a resident in an adjacent county and one was a foreign student.

Although all held temporary or permanent residence within commuting distance of the college during the study, none were natives of the area. Their length of residence ranged between 2 years and 22 years with the mean being 7.8 years and the median being 5 years. One was a native to Florida. Two of the participants were born out of the United States.

Educational and Employment Background

Six of the seven participants were seeking the A.S. degree; one was seeking the A.A. degree. Five were computer majors; the other two were majoring in park technology and secretarial science. One participant had a previous L.P.N. degree and was seeking an additional degree.

Five were full-time college students and of these five two had full-time non-professional jobs. Two participants

were part-time students and held full-time non-professional jobs.

All participants had some previous computer experience. No participants had taken a college-level geography course.

Statistical Methodology

Testing Method

As indicated in Chapter III a pretest consisting of ten questions (see Appendix D) to assess previous knowledge on land use planning was administered before the simulation. No introductory information other than that the students would be involved in doing a land use simulation was given to the participants prior to the simulation.

After the simulation the same test was administered as a post-test to the group to see if there was a statistically significant difference in results (has learning taken place?). Debriefing or discussion of the simulation is generally a part of the simulation process and occurs immediately after the simulation; such debriefing was not included so as not to bias the results.

The questions on the test were worth either 1, 2, or 3 points each (see Appendix D for scoring). Table 1 shows the raw scores of the students. Each student's scores are shown by individual question. The first column of data indicates the percentage achieved for each question on the pretest; the second data column indicates the percentage achieved on the post-test after the simulation. The last data column

TABLE 1
STUDENT RAW SCORES ON PRETEST AND POST-TEST

Student Number	Question Number	% Score Pretest	% Score Post-test	Post-test - Pretest
1	1	0	100	100
	2	0	100	100
	3	0	100	100
	4	0	100	100
	5	0	100	100
	6	0	50	50
	7	100	100	0
	8	50	100	50
	9	0	100	100
	10	100	100	0
2	1	0	0	0
	2	0	0	0
	3	0	0	0
	4	0	50	50
	5	33	33	0
	6	0	50	50
	7	100	100	0
	8	50	0	-50
	9	0	0	0
	10	50	50	0
3	1	0	67	67
	2	0	100	100
	3	0	100	100
	4	50	50	0
	5	0	100	100
	6	0	50	50
	7	100	100	0
	8	50	50	0
	9	0	100	100
	10	0	0	0
4	1	0	67	67
	2	0	100	100
	3	0	100	100
	4	0	100	100
	5	0	67	67
	6	0	50	50
	7	100	100	0
	8	0	100	100
	9	0	100	100
	10	50	50	0

TABLE 1--continued

Student Number	Question Number	% Score Pretest	% Score Post-test	Post-test - Pretest
5	1	0	33	33
	2	0	100	100
	3	0	100	100
	4	0	50	50
	5	0	0	0
	6	0	0	0
	7	0	0	0
	8	0	50	50
	9	0	100	100
	10	50	50	0
6	1	0	100	100
	2	0	100	100
	3	100	100	0
	4	50	50	0
	5	0	67	67
	6	0	0	0
	7	100	100	0
	8	50	50	0
	9	0	100	100
	10	50	50	0
7	1	0	67	67
	2	0	100	100
	3	0	0	0
	4	50	100	50
	5	0	33	33
	6	0	0	0
	7	100	100	0
	8	0	50	50
	9	0	0	0
	10	0	0	0

shows the difference between the pretest and post-test scores, again as percentage points.

Several statisitical tests were performed that corresponded to several queries that need to be addressed when evaluating this simulation. The first query to be asked is whether learning has taken place. After it is determined if learning has occurred, the second query is if there has been a statistically significant amount of learning (is the amount of knowledge revealed on the post-test statistically different than that of the pretest?). The third and fourth queries addressed concern the average increase in knowledge for all questions, and the average increase in knowledge for all students. Each of these queries and the statistical methodology to answer them are discussed below.

Has Learning Taken Place?

The first problem is to determine if learning has taken place. This problem was approached from two different directions: is there a difference between questions in learning and is there a difference between students in learning. If the answer to these questions is no, one can say that either all students have learned the same amount or that no students have learned. For there to be a significant difference in learning, learning must have taken place at least for one student.

How the percentage learned was calculated is as follows. First, what each student knew before the simulation was determined thereby also determining what remained

possible to learn. If a particular student did not have previous knowlege of an answer on the pretest, 0% achieved on a question, then that student can possibly learn 100%. However, if a student previously knew, for example, half the answer or 50% on a question worth two points, then that student can only learn 50% more. If a student knew the entire answer, 100% of an answer on the pretest, then no possible learning or 0% can take place on the post-test.

The first problem addressed concerns possible learning across all questions and across all students. If no learning can take place, that is, the student had 100% knowlege beforehand, the particular question was not included in the subsequent statistical analysis.

The formula that tells what possible learning (PL) could take place is the event space, the number of times an outcome occurs, divided by the sample space, the total of all possible outcomes, or

$$PL = \frac{CPOST - CPRE}{TPOSS - CPRE}$$

where CPRE is the total correct points achieved on the pretest; CPOST is the total correct points achieved on the post-test; and TPOSS is the total possible points that could be achieved on the test.

One-way analysis of variance (ANOVA) was used to statistically test whether there was a difference in learning between questions and whether there was a difference between students in learning. A confidence level of 95%, alpha equals 0.05, was choosen for both parts.

The null hypothesis for the first part of this problem stated that there was no significant difference in learning across all questions on the test. The alternative hypothesis was that there was a difference between learning across all questions. Table 2 presents the percentage of learning for all students across all questions using the formula described above; these data were used in calculating the analysis of variance. $F[v_1,v_2]$ represents the F statistic with degrees of freedom v_1 for the numerator and v_2 for the denominator. The critical value at F[8,52] degrees of freedom for an alpha score of 0.05 is 2.12 and the calculated F statistic was 2.51489. Since the calculated F falls within the tail of the distribution, the null hypothesis is rejected and the alternative hypothesis accepted, i.e., there is a difference between learning across all questions.

The null hypothesis for the second part of this problem stated that there was no significant difference in learning across all students. The alternative hypothesis was that there was a difference in learning across all students. Table 3 presents the percentage of learning for all questions across all students using the formula described above; these data were used in calculating the second analysis of variance. The critical value at F[6,55] degrees of freedom for an alpha score of 0.05 is 2.385 and the calculated F statistic for this part of the problem is

TABLE 2
PERCENTAGE OF LEARNING IN SULU BY STUDENT
ACROSS ALL QUESTIONS

Student	Question									
	1	2	3	4	5	6	7	8	9	10
1	100	100	100	100	100	50	X[a]	100	100	X
2	0	0	0	50	0	50	X	-50	0	0
3	67	100	100	0	100	50	X	0	100	0
4	67	100	100	100	67	50	X	0	100	0
5	33	100	100	50	0	0	0	50	100	0
6	100	100	X	0	67	0	X	0	100	0
7	67	100	0	100	33	0	X	50	0	0

[a] X denotes no learning was possible

TABLE 3
PERCENTAGE OF LEARNING IN SULU BY QUESTION
ACROSS ALL STUDENTS

Question[b]	Student						
	1	2	3	4	5	6	7
1	100	0	67	67	33	100	67
2	100	0	100	100	100	100	100
3	100	0	100	100	100	X[a]	0
4	100	50	0	100	50	0	0
5	100	0	100	67	0	67	33
6	50	50	50	50	0	0	0
7	X	X	X	X	0	X	X
8	100	-50	0	100	50	0	50
9	100	0	100	100	100	100	0
10	X	0	0	0	0	0	0

[a] X denotes no learning was possible
[b] Questions correspond to Appendix D

4.42284. The calculated F falls within the tail of the distribution and the null hypothesis is rejected and the alternative hypothesis is accepted; there is a difference in learning across all students.

In both cases the alternative hypothesis is accepted; there is a difference in learning across all questions and across all students. When there is a difference in learning, learning must have taken place.

Has There Been Significant Learning?

After determining that learning has taken place, the next step is to determine whether the amount of learning is statistically significant. This problem may be alternatively stated as is there a statistical significance between the percentage correct on the pretest and the percentage correct on the post-test for all students?

This problem reduces to one of the difference between two proportions (L'Esperance, 1971). The hypotheses are

H_0: there is no significant difference between the percentage correct on the pretest and the percentage correct on the post-test

H_1: there is a significant difference between the percentage correct on the pretest and percentage correct on the post-test.

The level of significance choosen was 95%, alpha equals 0.05.

Let P_i for i = 1,2 represent the population proportions or percentages on the two tests with P_1 representing the pretest percentage and P_2 the post-test percentage. Let p_i for i = 1,2 represent the sample proportions or percentages on the tests. The sampling

distribution is $p_1 - p_2$; these stand for the two class average percentages on the pretest and post-test, respectively. The calculated values p_1 and p_2 are 19% and 61%, respectively, and $p_1 - p_2$ is -0.042. Since we do not know the population values of P_1 and P_2 they are estimated by calculating the sample proportion of the combined data which is 0.40. The standard deviation of the sampling distribution $p_1 - p_2$ is 0.1589.

The critical values at alpha equals 0.05 are calculated to be 0.333 and -0.333. Since $p_1 - p_2$ or -0.42 falls within the left tail, (or it can be stated as $p_2 - p_1$ or 0.42 falls within the right tail) the null hypothesis is rejected and the alternative hypothesis is accepted. Therefore, there is a statistical difference between the percentage correct on the pretest and the percentage correct on the post-test.

Relationship Between the Average Increase and Questions

The third problem addressed involves the average increase in knowledge for all questions and the relationship of each individual question to the average. If the average increase in knowledge for all questions is the sample mean, then critical values can be determined for a t distribution. The average for each individual question can be mapped on the distribution in the left tail, central body or right tail. The position for each question is interpreted as to whether a less-than-average, average or greater-than-average increase in knowledge was revealed for that question.

The average increase in knowledge for all questions was 43.57%. Table 4 indicates the average increase in knowledge by question. With 9 degrees of freedom and alpha equals 0.05, the critical values are 23.01 and 64.13.

Questions 1, 3, 4, 5, 6 and 8 fell within the central body of the distribution, meaning that for these questions the participants revealed an average increase in knowledge. SULU shows a good level of imparting information to students for those concepts tested by these questions.

Questions 7 and 10 fell within the left tail. This can be interpreted that for these questions the participants showed a less-than-average increase in knowledge. It should be noted that with the exception of one participant, all the participants knew the complete answer to question 7 before the simulation, therefore no possible increase in knowledge could occur for those participants. By definition, then, question 7 must fall within the left tail as calculated. Furthermore, only one student did not know the answer in the pretest, thereby providing an insufficient sample to make generalizations about learning for question 7. Question 10 fell within the left tail of the distribution. The teaching of the concept covered in question 10 is revealed to be not one of the strong points of SULU.

Questions 2 and 9 fell within the right tail; for these questions the participants are revealed to have a greater-than-average increase in knowledge. This position in

TABLE 4
AVERAGE INCREASE ACROSS ALL QUESTIONS

Question Number	Average Increase (%)
1	61.91
2	85.71
3	57.14
4	50.00
5	52.38
6	28.57
7	0.00
8	28.57
9	71.43
10	0.00

the left tail shows areas or concepts that SULU teaches particularly well.

Relationship Between the Average Increase and Participants

The fourth and last problem calculates the average increase in knowledge for all participants and the relationship of each participant to the average of all participants. If the average increase in knowledge for all participants is the sample mean, then critical values can be determined for a t distribution. The average for each individual participant can then mapped on the distribution, indicating if the measurement falls in the left tail, central body or right tail. Each position reveals whether there is a less-than-average, average or greater-than-average increase in knowledge for that participant in relation to the whole group.

The average increase in knowledge for all participants was 43.57%. Table 5 indicates the average increase in knowledge by participant. With 6 degrees of freedom and alpha equals 0.05, the critical values are 64.58 and 22.56.

Participants 3, 5, 6 and 7 fell within the body of the distribution. This can be interpreted that these participants showed an average increase in knowledge; for those participants SULU is a satisfactory method of learning the geographical concepts of land use planning.

Participant 2 fell within the left tail, therefore this participant had a less-than-average increase in knowledge. This participant was a female full-time student

TABLE 5
AVERAGE INCREASE ACROSS ALL STUDENTS

Student Number	Average Increase (%)
1	70.00
2	5.00
3	51.67
4	68.33
5	43.33
6	36.67
7	30.00

who was graduating with an A.S. degree in computer programming. A sample of one student is not sufficiently large to make generalizations as to why there was less than average learning for this participant.

Participants 1 and 4 fell within the right tail of the distribution; these participants had a greater-than-average increase in knowledge; for them SULU was a particularly good means of learning land use planning. Participant 1 was a male full-time student who was graduating with an A.A. degree in computer science. Participant 4 was a female part-time student graduating with an A.S. degree in word processing management.

Results of Second Study

A repeat of the first experiment was executed with a second group of college students. Nineteen students participated in the second experiment. As with the first experiment, these participants were students in an introductory computer class and none had taken a college-level geography course. The second experiment was performed with the same conditions as the first experiment: a pretest was given, the simulation was performed, and post-test again given. Table 6 presents the raw scores of the pretest and post-test

The statistical results of the second experiment corroborate the results from the first experiment. As in the first experiment, analysis of variance was used to determine if there was a difference in learning across all questions.

TABLE 6
STUDENT RAW SCORES ON PRETEST AND POST-TEST
EXPERIMENT 2

Student Number	Question Number	% Score Pretest	% Score Post-test	Post-test - Pretest
1	1	0	100	100
	2	0	100	100
	3	0	100	100
	4	50	50	0
	5	0	67	67
	6	0	0	0
	7	100	50	-50
	8	0	0	0
	9	0	100	100
	10	0	50	50
2	1	0	67	67
	2	0	0	0
	3	0	100	100
	4	0	50	50
	5	0	33	33
	6	0	50	50
	7	100	100	0
	8	0	50	50
	9	0	100	100
	10	0	50	50
3	1	0	100	100
	2	0	100	100
	3	0	100	100
	4	0	100	100
	5	0	67	67
	6	0	50	50
	7	100	100	0
	8	50	50	0
	9	0	100	100
	10	0	50	50
4	1	0	100	100
	2	0	0	0
	3	0	0	0
	4	50	50	0
	5	33	0	-33
	6	0	50	50
	7	100	100	0
	8	50	50	0
	9	0	0	0
	10	0	50	50

TABLE 6--continued

Student Number	Question Number	% Score Pretest	% Score Post-test	Post-test - Pretest
5	1	0	100	100
	2	0	100	100
	3	0	100	100
	4	50	100	50
	5	0	0	0
	6	0	50	50
	7	100	100	0
	8	0	100	100
	9	100	100	0
	10	100	100	0
6	1	0	0	0
	2	0	100	100
	3	0	100	100
	4	50	100	50
	5	33	100	67
	6	50	100	50
	7	100	100	0
	8	0	50	50
	9	100	100	0
	10	50	50	0
7	1	0	100	100
	2	0	100	100
	3	0	100	100
	4	50	50	0
	5	0	33	33
	6	0	100	100
	7	100	100	0
	8	50	100	50
	9	0	100	100
	10	0	0	0
8	1	0	0	0
	2	0	0	0
	3	0	100	100
	4	50	100	50
	5	0	33	33
	6	0	50	50
	7	100	100	0
	8	50	50	0
	9	0	100	100
	10	50	50	0

TABLE 6--continued

Student Number	Question Number	% Score Pretest	% Score Post-test	Post-test - Pretest
9	1	0	100	100
	2	100	0	-100
	3	0	100	100
	4	50	50	0
	5	33	33	0
	6	0	50	50
	7	100	100	0
	8	50	0	-50
	9	0	100	100
	10	50	0	-50
10	1	0	67	67
	2	100	100	0
	3	0	0	0
	4	50	100	50
	5	0	33	33
	6	0	0	0
	7	100	100	0
	8	100	50	-50
	9	100	100	0
	10	50	50	0
11	1	0	100	100
	2	0	100	100
	3	0	100	100
	4	50	50	0
	5	0	67	67
	6	0	0	0
	7	100	100	0
	8	0	0	0
	9	0	100	100
	10	0	0	0
12	1	0	100	100
	2	0	100	100
	3	0	100	100
	4	0	50	50
	5	0	0	0
	6	0	0	0
	7	100	100	0
	8	0	0	0
	9	0	100	100
	10	50	50	0

TABLE 6--continued

Student Number	Question Number	% Score Pretest	% Score Post-test	Post-test - Pretest
13	1	0	67	67
	2	0	100	100
	3	0	100	100
	4	50	50	0
	5	0	0	0
	6	0	0	0
	7	50	100	50
	8	50	50	0
	9	0	100	100
	10	0	0	0
14	1	0	0	0
	2	0	0	0
	3	0	0	0
	4	0	100	100
	5	0	33	33
	6	0	0	0
	7	50	100	50
	8	50	50	0
	9	0	0	0
	10	0	50	50
15	1	0	100	100
	2	0	0	0
	3	0	100	100
	4	0	50	50
	5	0	0	0
	6	0	0	0
	7	0	100	100
	8	0	0	0
	9	0	0	0
	10	0	100	100
16	1	0	67	67
	2	0	100	100
	3	0	100	100
	4	50	100	50
	5	33	33	0
	6	50	50	0
	7	100	100	0
	8	50	100	50
	9	100	100	0
	10	100	50	-50

TABLE 6--continued

Student Number	Question Number	% Score Pretest	% Score Post-test	Post-test - Pretest
17	1	0	0	0
	2	0	100	100
	3	0	100	100
	4	50	100	50
	5	0	67	67
	6	0	50	50
	7	100	50	-50
	8	0	0	0
	9	0	100	100
	10	50	50	50
18	1	0	0	0
	2	0	0	0
	3	0	100	100
	4	0	50	50
	5	0	33	33
	6	0	0	0
	7	100	100	0
	8	50	0	-50
	9	0	0	0
	10	0	50	50
19	1	0	100	100
	2	0	100	100
	3	0	0	0
	4	0	50	50
	5	0	0	0
	6	0	0	0
	7	0	100	100
	8	0	50	50
	9	0	100	100
	10	0	50	50

In this second experiment, the critical value at F[9,156] degrees of freedom for an alpha score of 0.05 was 1.94. The calculated F statistic was 5.83845. The calculated F then fell well within the tail of the distribution. The alternative hypothesis was accepted; namely, there was a difference in learning across the questions, and therefore it was argued that learning had taken place.

In the second experiment, analysis of variance was also used to answer whether there was a difference in learning across all students. The analysis of variance statistic critical value of F[18,147] with an alpha level of 0.05 was 1.675. The calculated F statistic was 1.36992. The calcualted F was within the body of the distribution, but very near the critical point. Had an alpha level of 10% been selected instead of 5%, then the second test would have yielded the same results as the first. Nevertheless, one must accept the null hypothesis that no difference in learning between the students that participated in the second experiment could be discerned at alpha equals .05 level. Recall that there are two possible conclusions if there is no difference in learning, namely, that either no learning has taken place or that learning has taken place but is about equal for all the participants. Since the first analysis of variance showed clearly that there was a statistical difference in learning across all questions, one must accept the latter conclusion that learning did take

place about equally for all students. Therefore, if learning had occurred, then it did so uniformly across the students.

Tables 7 and 8 present the data used in both analysis of variance problems. Table 7 presents the percentage of learning across all questions; table 8 presents the percentage of learning across all students.

Again, following the procedure of the first experiment, a test was performed to determine if learning at a significant level had occurred. As in the first experiment this involves calculating the the difference between two proportions. Critical values at alpha equals 0.05 were calculated to be 0.331 and -0.331. The critical value for the sampling distribution $p_1 - p_2$ was calculated to be -0.35, which falls within the tail of the distribution. Consequently, the alternative hypothesis that there is a statistical difference between the percentage scored on the pretest and the percentage scored on the post-test is accepted. Thus it is concluded that learning took place and it did so uniformly across all students.

In the test to calculate which concepts SULU particularly excelled at, a similar pattern arose between the first experiment and the second experiment. Participants did particularly well on concepts tested by questions 1 and 9 in both studies. Concepts tested by question 3 were strong in the second experiment (in the right tail) and very near the right tail in the first experiment. Concepts tested by question 2 were strong in the first experiment (in the right

TABLE 7
PERCENTAGE OF LEARNING IN SULU BY STUDENT
ACROSS ALL QUESTIONS
EXPERIMENT 2

Student	Question									
	1	2	3	4	5	6	7	8	9	10
1	100	100	100	0	67	0	X[a]	0	100	50
2	67	0	100	50	33	50	X	50	100	50
3	100	100	100	100	67	50	X	0	100	50
4	100	0	0	0	-50	50	X	0	0	50
5	100	100	100	100	0	50	X	100	X	X
6	0	100	100	100	100	100	X	50	X	0
7	100	100	100	0	33	100	X	100	100	0
8	0	0	100	100	33	50	X	0	100	0
9	100	X	100	0	0	50	X	-100	100	-100
10	67	X	0	100	33	0	X	X	X	0
11	100	100	100	0	67	0	X	0	100	0
12	100	100	100	50	0	0	X	0	100	0
13	67	100	100	0	0	0	100	0	100	0
14	0	0	0	100	33	0	100	0	0	50
15	100	0	100	50	0	0	100	0	0	100
16	67	100	100	100	0	0	X	100	X	X
17	0	100	100	100	67	50	X	0	100	0
18	0	0	100	50	33	0	X	-100	0	50
19	100	100	0	50	0	0	100	50	100	50

[a] X denotes no learning was possible

TABLE 8
PERCENTAGE OF LEARNING IN SULU BY QUESTION
ACROSS ALL STUDENTS
EXPERIMENT 2

Question[b]	Student								
	1	2	3	4	5	6	7	8	9
1	100	67	100	100	100	0	100	0	100
2	100	0	100	0	100	100	100	0	X[a]
3	100	100	100	0	100	100	100	100	100
4	0	50	100	0	100	100	0	100	0
5	67	33	67	-50	0	100	33	33	0
6	0	50	50	50	50	100	100	50	50
7	X	X	X	X	X	X	X	X	X
8	0	50	0	0	100	50	100	0	-100
9	100	100	100	0	X	X	100	100	100
10	50	50	50	50	X	0	0	0	-100

[a] X denotes no learning was possible
[b] Questions correspond to Appendix D

TABLE 8--continued

Question[b]	Student									
	10	11	12	13	14	15	16	17	18	19
1	67	100	100	67	0	100	67	0	0	100
2	X[a]	100	100	100	0	0	100	100	0	100
3	0	100	100	100	0	100	100	100	100	0
4	100	0	50	0	100	50	100	100	50	50
5	33	67	0	0	33	0	0	67	33	0
6	0	0	0	0	0	0	0	50	0	0
7	X	X	X	100	100	100	X	X	X	100
8	X	0	0	0	0	0	100	0	-100	50
9	X	100	100	100	0	0	X	100	0	100
10	0	0	0	0	50	100	X	0	50	50

[a] X denotes no learning was possible
[b] Questions correspond to Appendix D

tail) and very near the right tail in the second experiment. Concepts tested by questions 7 and 10 fell into the left tail in both studies. Question 7 in the second experiment again was known by almost all the students beforehand; therefore no increase in knowledge could be shown. Concepts tested in question 10 seem to pose difficulties for the groups in both studies; this can be taken into account in future versions of SULU. Question 8 which in the first experiment was near the left tail, fell into the left tail in the second experiment. All other questions fell within the central body of the distribution in both experiments. Table 9 presents the average increase in knowledge across all questions.

In discussing the average increase in knowledge for both groups only generalizations can be made since we are dealing with two individual groups of people. The total overall mean increase in knowledge for all students was similar for both groups; the first group showed a 43% increase and the second group showed a 38% increase. In the first experiment 85% of the students tested found SULU to be a good to very good means of teaching land use planning concepts. In the second experiment, 74% found SULU to be a good to very good means of teaching land use planning concepts. Table 10 presents the average increase in knowledge across all students.

TABLE 9
AVERAGE INCREASE ACROSS ALL QUESTIONS

Question Number	Average Increase (%)
1	66.74
2	52.63
3	78.95
4	39.47
5	26.32
6	26.32
7	10.53
8	10.53
9	57.89
10	18.42

TABLE 10
AVERAGE INCREASE ACROSS ALL STUDENTS

Student Number	Average Increase (%)
1	46.70
2	50.00
3	66.70
4	16.70
5	50.00
6	41.70
7	58.30
8	33.30
9	15.00
10	10.00
11	46.70
12	45.00
13	41.70
14	23.30
15	45.00
16	31.70
17	41.70
18	18.30
19	55.00

The two experiments that were performed had results that were mutually supportive, lending credence to the assertion that this form of computer assisted instruction is an effective medium for transmitting information. As much as possible conditions were the same between the experiments. However, several months intervened between the experiments leading to a reasonable difference between prior information, as well as a change in enthusiasm, between the two sets of subjects. Much occurred during the time interval between experiments, most importantly a barage of information from the news media concerning conflict in land use and impact fees, topics covered in SULU and tested in the pretest and post-test. Much of this information concerned the rapid development occurring in Jacksonville, Florida, in whose market area Lake City belongs. Indeed, my impression from student conversations during the second experiment was that students were aware of land use problems; this was not the case in the first experiment. Hence, the population of "ideas" which the participant samples represented were not the same between the two experiments. Regardless of the greater "preknowledge" of subjects participating in the second experiment, the results indicated that learning took place.

Summary

Four queries have been formulated and subjected to statistical analysis. First, it was asked whether there has been learning in SULU, both across all questions and across

all students. Using analysis of variance (ANOVA) it has been verified at the confidence level of 95% that differential learning has occurred across the questions and across the participants. Since there has been a difference in learning, learning must have taken place. Second, it has been verified that learning has been statistically significant. A stastistical test of the difference of two proportions at the 95% confidence level confirmed this result. Third, using standard t tests, the particularly better-than-average and weaker-than-average teaching aspects of SULU have been identified. Fourth, using t tests the better-than-average participants and weaker-than- average participants in learning from SULU have been identified.

CHAPTER V
SUMMARY AND FUTURE DIRECTIONS

The area of geography addressed in this study has been land use planning. A study was performed to examine the understanding of typical first- and second-year college students of the geographical reasons for growth problems. A microcomputer-based simulation, Simulated Urban Land Use or SULU, was developed to serve as a vehicle for increasing their understanding of criteria and decisions that can be used to achieve the type of growth and environment desired by a community. It was hypothesized that by using a simulation on land use in which the students can actively participate that a significant amount of learning would take place about the geographical implications of typical land use policies.

In examining the literature, both popular and professional, a growing concern is evident over the lack of even the most basic of geographic skills on the part of citizens, including students at all levels of education. General awareness that geography is more than a collection of weakly related facts is also lacking and may be the result of often limiting geography in schools to place-name studies.

An effective medium for improving the dissemination of information concerning geographic ideas and the discipline of geography is through education. One proven method of educating students is simulation. The microcomputer is a particularly effective vehicle for educational simulations.

However, in reviewing computer software that is available today, it is obvious that there is a serious lack of software on human geography topics. The majority of commercial software, including simulations, teaches only place-name geography or geography trivia. Software written by geographers, though more sophisticated in topic and pedagogically sound, is technologically out of date, having largely been written on mainframes before the age of microcomputers. Few software programs are available that address the specific topic of land use planning. Furthermore, there is a lack of simulations that take into account that decision-making generally involves many decision makers, each with different sets of objectives and with different sets of criteria for making various decisions. This study addressed some of these problems.

In SULU students play the roles of various participants in land use planning, including government officials and city planners, business people, environmentalists, developers, land owners and concerned cititzens. Their purpose is to develop or not develop various parcels of land in and around the city of Gainesville, Florida. Some of the development choices

available to the participants include developing residential areas, parks, small and large businesses, transportation networks and manufacturing industries. Each decision voted for by the participants affected their personal welfare and the community's welfare; these effects were reflected in changes to each participant's money assets and quality-of-life assets. Participants had to deal with pre-existing development, vacancy rates and population. During the simulation chance occurrences such as pollution spills and cuts in federal spending were likely to happen, and regular occurrences such as payment of taxes and increases in population also had to be taken into account.

A pretest and post-test on student knowledge and learning of land use planning were given. Statistical results were calculated for several hypotheses. These hypotheses included: did learning take place as a result of participation in SULU; was the amount of learning statistically significant; how did each student and each question fare when compared to the average across all students and across all questions. The statistical method employed to verify if learning had taken place was analysis of variance (ANOVA); the method used for verification of statistically significant learning was a test of the difference of two porportions; the method used for analyzing those students and questions that fared particularly poorly or particularly well was a standard t test. It was shown that the SULU simulation was an effective method of learning

land use planning. With the exception of one student SULU was a good or very good means of learning land use planning. With the exception of two questions, one of which most students knew the answer to beforehand, SULU was good to very strong in teaching particular land use information.

Future directions can be viewed from two different perspectives: the perspective of how SULU can continue to be developed and the more general perspective of how computer simulations can become more a part of the teaching of human geography.

Within SULU there are several avenues of future expansions that could be pursued. The types of development allowed in SULU can be expanded beyond the original seven types; these new types could be related to actual types that are under present consideration in the community, for example, research and development industrial parks and solid waste disposal and transfer sites. Vacancy rates for business buildings could be considered in addition to residential vacancy rates. Areas of residency for the various actors in SULU could be a part of the simulated environment. A database of maps and land uses of various United States cities could be established for use with SULU. With the development and sale of an operating system for IBM's new Personal System 2 higher resolution in the map and expanded use of color could be included.

Within geography there are many avenues of future expansion. Because simulations are such a good method of

actively involving students in the learning process, more computer simulations in human geography need to be developed. Specific areas that need to be addressed include topics such as agricultural land use, central place theory, industrial location, gravity and spatial interaction models, population density, and diffusion. The area of human geography computer simulations is in its infancy and wide open to geographers since so little software exists. The field is limitless to the imaginative geographer.

With greater technological advances in transportation and communication the world is becoming smaller and smaller. During the year 1987 the population of the world reached the 5 billion mark. Citizens of the world are seeking equitable methods of developing land and allocating resources and are looking to geographers for answers. Geography and simulation can no longer be ignored nor relegated to being an insignificant piece of the educational pie.

APPENDIX A
PLAYER ASSETS AT START OF SIMULATION

$: MONETARY	CREDITS: QUALITY OF LIFE
GOVERNMENT OFFICIAL	$100 6 CREDITS
CITY PLANNER	$100 6 CREDITS
LAND DEVELOPER	$100 6 CREDITS
ENVIRONMENTALIST	$100 6 CREDITS
LAND OWNER/FARMER	$100 6 CREDITS
SMALL BUSINESS OWNER	$100 6 CREDITS
BIG-BUSINESS OWNER	$100 6 CREDITS
LOW-INCOME CITIZEN	$50 5 CREDITS
MIDDLE-INCOME CITIZEN	$100 6 CREDITS
HIGH-INCOME CITIZEN	$150 7 CREDITS

APPENDIX B
COSTS AND BENEFITS OF THE DEVELOPMENT CHOICES

1. SINGLE-FAMILY DWELLINGS

Benefits:

a. $10 for developer
b. $10 for land owner/farmer if land previously unoccupied
c. 1 quality-of-life (QL) credit for increased quality of life for those living next to it

Costs:

a. If vacancy rate is high, -1 QL credit due to increased vacant housing which may lead to empty housing, and depressed housing market

2. MULTIPLE-FAMILY DWELLINGS

Benefits:

a. $10 for developer
b. $10 for and owner/farmer if land previously unoccupied

Costs:

a. If vacancy rate is high, -1 QL credit due to increased vacant housing, which may lead to empty housing and depressed housing market

3. SMALL RETAIL AND PROFESSIONAL

Benefits:

a. $5 for developer
b. $10 for small-business person

4. LARGE RETAIL BUSINESS

Benefits:

a. $10 for developer
b. $10 for big-business person
c. 1 QL credit due to more jobs for the community

Costs:

a. $5 from all for cost of infrastructure
b. -1 QL credit due to low quality of life for those living next to it due to traffic congestion, noise etc.

5. MANUFACTURING INDUSTRY

Benefits:

a. $10 for big business person
b. 1 QL credit due to increased revenues and jobs for the community
c. 1 QL credit for low-income citizens because they will most likely be the persons hired

Costs:

a. -1 QL credit due to pollution caused by heavy industry
b. -1 QL credit due to having to establish a dumpsite for wastes in the community
c. $5 from all for cost of infrastructure

6. PARKLAND

Benefits:

a. 1 QL credit for increased recreational space for all

Costs:

a. -1 QL credit for the developer because this land parcel can no longer be developed
b. $5 from all for cost of park development unless money comes from park fund

7. TRANSPORTATION NETWORK

Benefits:

a. 1 QL credit due to increased transportation facilities

Costs:

a. -1 QL credit due to low quality of life for those living next to it (e.g., noise and traffic congestion)
b. $5 from all for cost of infrastructure

APPENDIX C
COSTS AND BENEFITS OF OTHER OPTIONS

1. TIE DEVELOPMENT TO THE VACANCY RATE

   Benefits:
   Forces infilling of occupied areas; thus vacancy rate does not increase as rapidly as when developing unoccupied areas

   Costs:
   Land/owner farmer makes no profit

2. IMPOSE IMPACT FEES ON DEVELOPMENT

   Benefits:
   No infrastructure tax for private development; developer who is making profits must pay for infrastructure

   Costs:
   Developer makes less profit

3. CHARGING A FEE FOR ANY DEVELOPMENT; FEE PLACED IN FUND FOR PARKS

   Benefits:
   $10 set aside for parks for each type of private development

   Costs:
   Developers and business people get less profit

APPENDIX D
PRETEST AND POST-TEST[a]

1. When referring to land development, what is infrastructure? (3 points)

(Ans: sewers; roads; utilities; new schools; fire, police, ambulance service)

2. Who usually pays for the cost of infrastructure? (1 point)

(Ans: all citizens)

3. What are impact fees? (1 point)

(Ans: fees developers must pay for infrastructure needed by their development)

4. What types of development may most negatively affect the quality of life of those living near it? (2 points)

(Ans: industry; dumpsite; large retail center; large transportation facility)

5. Who are the most influential people involved in land use planning? (3 points)

(Ans: government officials, city planners, land developers)

6. How does the vacancy rate in housing affect the quality of life? (2 points)

(Ans: a high vacancy rate decreases the quality of life; causes prices of housing to decline; vandals may be attracted to abandoned housing)

7. Name something negative and positive about a manufacturing industry locating in a city. (2 points)

(Ans: Negative: may cause pollution, traffic congestion; Positive: new jobs created; more money brought into community)

[a] Possible answers follow each question in parenthesis.

8. What might be some considerations in locating a park? (2 points)

(Ans: is it near to people; is it away from polluting industry)

9. If you were a city planner, what factor(s) would you consider before allowing more building permits for housing? (1 point)

(Ans: current vacancy rate)

10. What might be some considerations when locating a manufacturing industry? (2 points)

(Ans: not near residentail neighborhoods; how far must wastes be hauled to dumpsite; is infrastructure in place to handle increased traffic)

APPENDIX E
THE PROGRAM SULU

The following pages include a listing of the program used in this dissertation. It is included here for completeness. The program was written in BASIC and assembly language, and, following standard form, it is therefore listed all in assembly.

While the program was written for an 8088 microcprocessor-based computer, there are sufficient variations among computers which may not be truly 100% compatible; the reader is advised to contact the author regarding obtaining disk copies of the program.

Inquiries regarding obtaining copies of SULU should be sent to

Susan M. Elshaw Thrall
c/o Department of Geography
3141 Turlington
University of Florida
Gainesville, Florida 32611

If author is no longer in residence, the geography department will forward your inquiry.

```
CALL    [DI+12]
MOV     SP,2002
DB      C0
ADD     [SI+12],BH
MOV     BYTE PTR [BP+SI],91
AND     AH,[BX+SI]
INC     BX
DEC     DI
PUSH    AX
POP     CX
PUSH    DX
DEC     CX
INC     DI
DEC     AX
PUSH    SP
CMP     AH,[BX+SI]
PUSH    BX
PUSH    BP
PUSH    BX
INC     CX
DEC     SI
AND     [DI+4C],AL
PUSH    BX
DEC     AX
INC     CX
PUSH    DI
AND     [SI+48],DL
PUSH    DX
INC     CX
DEC     SP
DEC     SP
AND     AL,[BX+SI]
NOP
ADC     AH,[DI]
ADD     DI,[BP+SI]
POP     CX
DB      6C
DB      65
DB      67
DB      65
DB      6E
DB      64
AND     [BP+SI+6F],AH
JS      01A6
JNB     0143
CALL    4C03:2A12
POP     CX
OUT     EA,AX
ADC     AL,[BX+SI]
MOV     DI,2F12
ADD     DI,[BP+SI]
POP     CX
INC     BX
PUSH    BP
PUSH    DX
PUSH    BX
DEC     DI
PUSH    DX
AND     [SI+4F],CL
INC     BX
INC     CX
PUSH    SP
DEC     CX
DEC     DI
DEC     SI
AND     [BP+4F],AL
PUSH    DX
AND     [SI+41],CL
DEC     SI
INC     SP
AND     [DI+53],DL
INC     BP
PUSH    BX
ADD     AL,CL
ADC     DH,[SI]
ADD     CX,[SI+58]
OUT     12,AX
ADD     CL,BL
ADC     BH,[8603]
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,28
SBB     [BX+DI],BP
ADD     DH,DH
ADC     CL,[BX+SI+03]
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,28
ADC     CH,[BX+DI]
OUT     22,AX
PUSH    BX
DB      69
DB      6E
DB      67
DB      6C
DB      65
AND     [BP+61],AL
DB      6D
CS:
AND     AL,[BX+SI]
ADC     AX,5213
ADD     AX,[BP+DI+48]
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,28
ADC     BP,[BX+DI]
OUT     22,AX
DEC     BP
JNZ     0228
JZ      0227
JO      022C
DB      65
AND     [BP+61],AL
DB      6D
CS:
AND     AL,[BX+SI]
XOR     DX,[BP+DI]
POP     SP
ADD     AX,[BP+DI+48]
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,28
ADC     AL,29
OUT     22,AX
PUSH    BX
DB      6D
DB      61
DB      6C
DB      6C
AND     [BP+SI+65],DL
JZ      0243
DB      69
DB      6C
AND     AL,[BX+SI]
PUSH    CX
ADC     SP,[BP+03]
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,28
ADC     AX,E729
AND     CL,[SI+61]
JB      0261
DB      65
AND     [BP+SI+65],DL
JZ      0261
DB      69
DB      6C
AND     AL,[BX+SI]
DB      6B
ADC     SI,[BX+SI+03]
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,28
PUSH    SS
SUB     DI,SP
AND     CL,[BX+DI+6E]
DB      64
JNZ     028C
JZ      028D
JNS     023F
ADD     [DI+7A13],AL
ADD     AX,[BP+DI+48]
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,28
POP     SS
SUB     DI,SP
AND     DL,[BX+SI+61]
JB      029D
DB      6C
DB      61
DB      6E
DB      64
AND     AL,[BX+SI]
MOV     AX,[8413]
ADD     AX,[BP+DI+48]
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,28
SBB     [BX+DI],CH
OUT     22,AX
PUSH    SP
JB      02AC
DB      6E
JNB     02BE
DB      6F
JB      02C5
CS:
AND     AL,[BX+SI]
MOV     BP,8E13
ADD     AX,[BP+DI+48]
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,28
SBB     [BX+DI],BP
OUT     22,AX
INC     SI
DB      61
JB      02D5
DAS
INC     BP
DB      6D
JO      02E1
JNS     0291
ADD     CH,CL
ADC     BX,[BX+SI+8603]
AND     [BX+52],AL
DEC     CX
```

```
INC     SP
AND     AL,28
POP     CS
OR      BP,[BX+DI]
ADD     DH,BL
ADC     SP,[BP+SI+8203]
AND     [BX+DI+20],CL
OUT     20,AX
ADC     AH,[BX+SI]
INT     3
AND     [BX],CL
OR      AX,[BX+SI]
IN      AX,DX
ADC     BP,[SI+8703]
AND     [BX+52],AL
DEC     CX
INC     SP
AND     AL,28
DEC     CX
SUB     [BX+SI],AX
CMC
ADC     SI,[BP+8303]
AND     [BX+DI+00],CL
SBB     AL,14
DB      C0
ADD     AX,[SI+3020]
XOR     [SI],BP
XOR     [BP+SI],DH
SUB     AL,30
XOR     BP,[SI]
XOR     [SI],DH
SUB     AL,30
XOR     AX,302C
SS:
SUB     AL,30
AAA
SUB     AL,30
CMP     [SI],CH
XOR     [BX+DI],BH
SUB     AL,31
XOR     [SI],CH
XOR     [BX+DI],SI
ADD     [BP+SI],DH
ADC     AL,CA
ADD     DI,[BP+SI]
POP     CX
DB      63
DB      6F
DB      6C
DB      6F
JB      02FC
JO      033F
JZ      0354
DB      65
JB      0351
JNB     02E5
DS:
ADC     AL,D4
ADD     AX,[BP+5020]
AND     AL,28
SBB     CH,[BX+DI]
ADD     [BX+SI+DE14],CL
ADD     DX,[BX+SI+24]
SUB     [BP+SI],DL
SUB     DI,SP
CALL    [BP+0C28]
INC     BP
ADD     [BX+DI],CH
JMP     9A04
SUB     [SI],CL
ADD     [BX+SI],AX
SUB     CX,BP
CALL    [BP+0C28]
ADC     [BX+SI],AX
SUB     CX,BP
CALL    [BP+0C28]
PUSH    BP
ADD     [BX+DI],CH
JMP     9A1C
SUB     [SI],CL
PUSH    SP
ADD     [BX+DI],CH
JMP     9A24
SUB     [SI],CL
ADC     [BX+SI],AL
SUB     CX,BP
CALL    [BP+0C28]
ADC     [BX+SI],AX
SUB     CX,BP
CALL    [BP+0C28]
PUSH    BP
ADD     [BX+DI],CH
ADD     [BP+SI+E814],AH
ADD     DX,[BX+SI+24]
SUB     [BP+DI],DL
SUB     DI,SP
CALL    [BP+0C28]
PUSH    AX
ADD     [BX+DI],CH
JMP     9A4E
SUB     [SI],CL
ADD     [BX+SI],AL
SUB     [BX+SI],AX
MOV     SP,F214
ADD     DX,[BX+SI+24]
SUB     [SI],DL
SUB     DI,SP
CALL    [BP+0C28]
INT     3
ADD     [BX+DI],CH
JMP     9A68
SUB     [SI],CL
XOR     AX,[BX+SI]
SUB     [BX+SI],AX
INTO
ADC     AL,FC
ADD     DX,[BX+SI+24]
SUB     [DI],DL
SUB     DI,SP
CALL    [BP+0C28]
INC     WORD PTR [BX+SI]
SUB     [BX+SI],AX
LOOPNZ  0397
PUSH    ES
ADD     AL,50
AND     AL,28
PUSH    SS
SUB     DI,SP
CALL    [BP+0C28]
STOSB
ADD     [BX+DI],CH
ADD     DL,DH
ADC     AL,10
ADD     AL,50
AND     AL,28
POP     SS
SUB     DI,SP
CALL    [BP+0C28]
PUSH    BP
ADD     [BX+DI],CH
ADD     [SI],CL
ADC     AX,041A
PUSH    AX
AND     AL,28
SBB     [BX+DI],CH
OUT     FF,AX
XCHG    SI,AX
SUB     [SI],CL
MOV     [BX+SI],AL
SUB     CX,BP
CALL    [BP+0C28]
AND     AL,[BX+SI]
SUB     [BX+SI],AX
PUSH    DS
ADC     AX,0424
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
OUT     FF,AX
XCHG    SI,AX
SUB     [SI],CL
ADD     [BX+SI],AL
SUB     [BX+SI],AX
DEC     AX
ADC     AX,0429
PUSH    AX
AND     AL,28
SBB     CH,[BX+DI]
OUT     FF,AX
XCHG    SI,AX
SUB     [SI],CL
JMP     03E1
SUB     CX,BP
CALL    [BP+0C28]
MOV     SI,2900
JMP     9AEC
SUB     [SI],CL
MOV     SI,2900
JMP     9AF4
SUB     [SI],CL
JMP     03F9
SUB     [BX+SI],AX
DB      64
ADC     AX,042E
CMP     CL,[BX+41D9]
PUSH    DX
PUSH    DX
INC     CX
POP     CX
AND     [SI+4F],DL
AND     [BX+SI+4F],CL
DEC     SP
INC     SP
AND     [BP+DI+4F],AL
DEC     SP
DEC     DI
PUSH    DX
PUSH    BX
ADD     [SI+15],DH
CMP     [SI],AL
XCHG    [BX+SI],AH
PUSH    SP
AND     AL,28
POP     CS
OR      BP,[SI]
POP     CS
PUSH    CS
SUB     [BX+SI],AX
XCHG    BP,AX
ADC     AX,0442
AND     BYTE PTR [BX+SI],4A
OUT     12,AX
AND     AH,CL
AND     [BX],CL
PUSH    CS
CMP     DL,[SI+24]
SUB     [BP+SI],DL
SUB     AL,4A
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     AL,[BP+DI+4A20]
ADD     [BX+4C15],AH
ADD     AL,54
AND     AL,28
ADC     CH,[SI]
ADC     AX,E729
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
ADD     [BX+DI+5615],BH
ADD     AL,54
AND     AL,28
```

```
ADC     CH,[SI]
PUSH    SS
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AL,29
ADD     [SI+16],CL
DB      60
ADD     AL,54
AND     AL,28
ADC     BP,[SI]
ADC     CH,[BX+DI]
OUT     50,AX
AND     AL,28
SBB     [BX+DI],BP
CMP     DL,[SI+24]
SUB     [BP+DI],DL
SUB     AL,13
SUB     DI,SP
PUSH    AX
AND     AL,28
PUSH    SS
SUB     [BP+SI],DI
PUSH    SP
AND     AL,28
ADC     BP,[SI]
ADC     AL,29
OUT     50,AX
AND     AL,28
SBB     [BX+DI],BP
CMP     DL,[SI+24]
SUB     [BP+DI],DL
SUB     AL,15
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     DL,[SI+24]
SUB     [BP+DI],DL
SUB     AL,16
SUB     DI,SP
PUSH    AX
AND     AL,28
PUSH    SS
SUB     [BP+SI],DI
PUSH    SP
AND     AL,28
ADC     BP,[SI]
POP     SS
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AL,29
CMP     AL,[BP+SI+4A20]
OUT     18,AX
AND     AH,CL
AND     [BX],CL
OR      AL,3A
PUSH    SP
AND     AL,28
ADC     BP,[SI]
DEC     DX
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     AL,[BP+DI+4A20]
CMP     DL,[SI+24]
SUB     [BP+DI],DL
SUB     AL,0F
OR      AX,E729
PUSH    AX
AND     AL,28
PUSH    SS
SUB     [BP+SI],DI
PUSH    SP
AND     AL,28
ADC     BP,[SI]
POP     CS
PUSH    CS
SUB     DI,SP
PUSH    AX
AND     AL,28
PUSH    SS
SUB     [BX+SI],AX
MOV     WORD PTR [046A],2454
SUB     [SI],DL
SUB     AL,12
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     AL,[BP+SI+4A20]
AND     BH,AH
AND     [BP+DI],DL
AND     AH,CL
AND     [BX],DL
CMP     DL,[SI+24]
SUB     [SI],DL
SUB     AL,4A
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     AL,[BP+DI+4A20]
CMP     DL,[SI+24]
SUB     [SI],DL
SUB     AL,18
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AL,29
CMP     AL,[BP+SI+4A20]
OUT     19,AX
AND     [BX+SI],AH
INT     3
AND     [BX],CL
OR      AL,3A
AND     [SI+24],DL
SUB     [SI],DL
SUB     AL,4A
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     AL,[BP+DI+4A20]
CMP     DL,[SI+24]
SUB     [SI],DL
SUB     AL,0F
OR      AX,E729
PUSH    AX
AND     AL,28
SBB     [BX+DI],CH
CMP     DL,[SI+24]
SUB     [SI],DL
SUB     AL,0F
PUSH    CS
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],CH
ADD     [DI],AH
POP     SS
JZ      0582
AND     BYTE PTR [BX+SI],4A
OUT     12,AX
AND     AH,CL
AND     [BX],CL
OR      BH,[BP+SI]
PUSH    SP
AND     AL,28
ADC     AX,4A2C
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     AH,[BX+SI]
AND     WORD PTR [BX+SI],+4A
CMP     AH,[BX+SI]
PUSH    SP
AND     AL,28
ADC     AX,192C
SUB     DI,SP
PUSH    AX
AND     AL,28
PUSH    SS
SUB     [BP+SI],DI
PUSH    SP
AND     AL,28
ADC     AX,0F2C
OR      BP,[BX+DI]
OUT     50,AX
AND     AL,28
PUSH    SS
SUB     [BP+SI],DI
AND     BYTE PTR [BX+SI],4A
OUT     0F,AX
OR      AL,20
INT     3
AND     [BX],CL
PUSH    CS
CMP     DL,[SI+24]
SUB     [DI],DL
SUB     AL,4A
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],CH
CMP     AL,[BP+DI+4A20]
ADD     [DI+7E17],BH
ADD     AL,82
AND     [BP+SI-19],CL
ADC     AH,[BX+SI]
INT     3
AND     [BX],DL
CMP     DL,[SI+24]
SUB     [4A2C],DL
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     AL,[BP+DI+4A20]
CMP     DL,[SI+24]
SUB     [132C],DL
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AL,29
CMP     DL,[SI+24]
SUB     [182C],DL
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AX,3A29
PUSH    SP
AND     AL,28
PUSH    SS
SUB     AL,19
SUB     DI,SP
PUSH    AX
AND     AL,28
PUSH    SS
SUB     [BP+SI],DI
PUSH    SP
AND     AL,28
PUSH    SS
SUB     AL,1A
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     DL,[SI+24]
SUB     [0F2C],DL
OR      CH,[BX+DI]
```

```
OUT     50,AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     AH,[BX+SI]
PUSH    SP
AND     AL,28
PUSH    SS
SUB     AL,0F
OR      BP,[BX+DI]
OUT     50,AX
AND     AL,28
PUSH    SS
SUB     [BP+SI],DI
AND     BYTE PTR [BX+SI],4A
AND     BH,AH
AND     [BX],CL
OR      AL,20
INT     3
AND     [BX],CL
PUSH    CS
CMP     AH,[BX+SI]
PUSH    SP
AND     AL,28
PUSH    SS
SUB     AL,4A
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],CH
CMP     AL,[BP+DI+4A20]
ADD     [DI],DH
SBB     [BX+SI+8204],CL
AND     [BP+SI-19],CL
ADC     AH,[BX+SI]
INT     3
AND     [BP+SI],BL
CMP     DL,[SI+24]
SUB     [BX],DL
SUB     AL,4A
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     AL,[BP+DI+4A20]
CMP     DL,[SI+24]
SUB     [BX],DL
SUB     AL,17
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     BP,[BX+DI]
CMP     DL,[SI+24]
SUB     [BX],DL
SUB     AL,19
SUB     DI,SP
PUSH    AX
AND     AL,28
PUSH    SS
SUB     [BP+SI],DI
PUSH    SP
AND     AL,28
POP     SS
SUB     AL,0F
OR      CH,[BX+DI]
OUT     50,AX
AND     AL,28
ADC     AL,29
CMP     DL,[SI+24]
SUB     [BX],DL
SUB     AL,0F
OR      BP,[BX+DI]
OUT     50,AX
AND     AL,28
PUSH    SS
SUB     [BP+SI],DI
AND     BYTE PTR [BX+SI],4A
OUT     0F,AX
OR      AL,20
INT     3
AND     [BX],CL
PUSH    CS
CMP     DL,[SI+24]
SUB     [BX],DL
SUB     AL,4A
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     AL,[BP+DI+4A20]
ADD     CL,BL
SBB     [BP+SI+8204],DL
AND     [BP+SI-19],CL
ADC     AH,[BX+SI]
INT     3
AND     [BX],DL
CMP     DL,[SI+24]
SUB     [BX+SI],BL
SUB     AL,4A
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     AL,[BP+DI+4A20]
CMP     AH,[BX+SI]
PUSH    SP
AND     AL,28
SBB     [SI],CH
ADC     AL,29
OUT     50,AX
AND     AL,28
ADC     AL,29
CMP     DL,[SI+24]
SUB     [BX+SI],BL
SUB     AL,18
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AL,29
CMP     DL,[SI+24]
SUB     [BX+SI],BL
SUB     AL,19
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AX,3A29
PUSH    SP
AND     AL,28
SBB     [SI],CH
SBB     CH,[BX+DI]
OUT     50,AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     DL,[SI+24]
SUB     [BX+SI],BL
SUB     AL,0F
OR      CH,[BX+DI]
OUT     50,AX
AND     AL,28
ADC     AL,29
CMP     DL,[SI+24]
SUB     [BX+SI],BL
SUB     AL,0F
OR      BP,[BX+DI]
OUT     50,AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     DL,[SI+24]
SUB     [BX+SI],BL
SUB     AL,0F
OR      AL,29
OUT     50,AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     DL,[SI+24]
SUB     [BX+SI],BL
SUB     AL,0F
OR      AX,E729
PUSH    AX
AND     AL,28
POP     SS
SUB     [BP+SI],DI
PUSH    SP
AND     AL,28
SBB     [SI],CH
POP     CS
PUSH    CS
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
ADD     [BX+SI+9C19],AL
ADD     AL,54
AND     AL,28
SBB     [SI],BP
ADC     CH,[BX+DI]
OUT     50,AX
AND     AL,28
ADC     AX,3A29
PUSH    SP
AND     AL,28
SBB     [SI],BP
ADC     BP,[BX+DI]
OUT     50,AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     DL,[SI+24]
SUB     [BX+DI],BL
SUB     AL,14
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     AL,[BP+SI+4A20]
AND     BH,AH
AND     [DI],DL
AND     AH,CL
AND     [BX],DL
CMP     AH,[BX+SI]
PUSH    SP
AND     AL,28
SBB     [SI],BP
DEC     DX
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AX,3A29
AND     WORD PTR [BX+SI],+4A
CMP     AH,[BX+SI]
PUSH    SP
AND     AL,28
SBB     [SI],BP
SBB     [BX+DI],CH
OUT     50,AX
AND     AL,28
ADC     AL,29
CMP     DL,[SI+24]
SUB     [BX+DI],BL
SUB     AL,19
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AX,3A29
AND     BYTE PTR [BX+SI],4A
OUT     1A,AX
AND     AH,CL
AND     [BX],CL
OR      DI,[BP+SI]
PUSH    SP
AND     AL,28
SBB     [SI],BP
DEC     DX
SUB     DI,SP
PUSH    AX
AND     AL,28
```

```
ADC     CH,[BX+DI]
CMP     AL,[BP+DI+4A20]
CMP     AH,[BX+SI]
AND     BYTE PTR [BX+SI],4A
OUT     0F,AX
OR      AL,20
INT     3
AND     [BX],CL
PUSH    CS
CMP     AH,[BX+SI]
PUSH    SP
AND     AL,28
SBB     [SI],BP
DEC     DX
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     AL,[BP+DI+4A20]
ADD     [BX+DI+1A],AL
CMPSB
ADD     AL,54
AND     AL,28
SBB     CH,[SI]
ADC     CH,[BX+DI]
OUT     50,AX
AND     AL,28
SBB     [BX+DI],BP
CMP     DL,[SI+24]
SUB     [BP+SI],BL
SUB     AL,13
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     DL,[SI+24]
SUB     [BP+SI],BL
SUB     AL,14
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AL,29
CMP     AL,[BP+SI+4A20]
AND     BH,AH
AND     [DI],DL
AND     AH,CL
AND     [BX],DL
CMP     DL,[SI+24]
SUB     [BP+SI],BL
SUB     AL,4A
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     AX,3A29
AND     WORD PTR [BX+SI],+4A
CMP     DL,[SI+24]
SUB     [BP+SI],BL
SUB     AL,18
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     DL,[SI+24]
SUB     [BP+SI],BL
SUB     AL,19
SUB     DI,SP
PUSH    AX
AND     AL,28
PUSH    SS
SUB     [BP+SI],DI
PUSH    SP
AND     AL,28
SBB     CH,[SI]
SBB     CH,[BX+DI]
OUT     50,AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     AL,[BP+SI+4A20]
OUT     0F,AX
OR      AH,[BX+SI]
INT     3
AND     [BX],CL
OR      DI,[BP+SI]
PUSH    SP
AND     AL,28
SBB     CH,[SI]
DEC     DX
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     AL,[BP+DI+4A20]
CMP     AL,[BP+SI+4A20]
OUT     0F,AX
OR      AL,20
INT     3
AND     [BX],CL
OR      AX,543A
AND     AL,28
SBB     CH,[SI]
DEC     DX
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     AL,[BP+DI+4A20]
CMP     DL,[SI+24]
SUB     [BP+SI],BL
SUB     AL,0F
PUSH    CS
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
ADD     [SI+B01A],BH
ADD     AL,82
AND     [BP+SI-19],CL
ADC     AH,[BX+SI]
INT     3
AND     [543A],DL
AND     AL,28
POP     CS
OR      CH,[SI]
DEC     DX
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     AL,[BP+DI+4A20]
CMP     DL,[SI+24]
SUB     [BX],CL
OR      CH,[SI]
ADC     BP,[BX+DI]
OUT     50,AX
AND     AL,28
ADC     BP,[BX+DI]
CMP     DL,[SI+24]
SUB     [BX],CL
OR      CH,[SI]
POP     SS
SUB     DI,SP
PUSH    AX
AND     AL,28
POP     SS
SUB     [BP+SI],DI
PUSH    SP
AND     AL,28
POP     CS
OR      CH,[SI]
SBB     [BX+DI],CH
OUT     50,AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     DL,[SI+24]
SUB     [BX],CL
OR      CH,[SI]
SBB     [BX+DI],BP
OUT     50,AX
AND     AL,28
ADC     CH,[BX+DI]
CMP     AL,[BP+SI+4A20]
OUT     1A,AX
AND     AH,CL
AND     [BX],CL
PUSH    CS
CMP     DL,[SI+24]
SUB     [BX],CL
OR      CH,[SI]
DEC     DX
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     AL,[BP+DI+4A20]
ADD     CH,CH
SBB     BH,[BP+SI+8204]
AND     [BP+SI-19],CL
ADC     AH,[BX+SI]
INT     3
AND     [BX],CL
PUSH    CS
CMP     DL,[SI+24]
SUB     [BX],CL
OR      BP,[SI]
DEC     DX
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
CMP     AL,[BP+DI+4A20]
CMP     DL,[SI+24]
SUB     [BX],CL
OR      BP,[SI]
POP     SS
SUB     DI,SP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
ADD     BL,BH
SBB     BH,[BX+4604]
DEC     DI
PUSH    DX
DEC     BP
INC     CX
PUSH    SP
AND     [BX+DI+3A],AL
ADD     [141B],DL
ADD     AX,8F3A
FLD     DWORD PTR [BX+DI+52]
PUSH    DX
INC     CX
POP     CX
AND     [SI+4F],DL
AND     [BX+SI+4F],CL
DEC     SP
INC     SP
AND     [BP+DI+45],DL
INC     BP
INC     SP
PUSH    BX
ADD     [SI],DH
SBB     BX,[8605]
AND     [BX+SI+4D],BL
INC     CX
PUSH    AX
SUB     [BX],CL
OR      BP,[SI]
POP     CS
PUSH    CS
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
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SUB     [BX],CL
OR      BP,[SI]
POP     CS
PUSH    CS
SUB     [BX+SI],AX
INC     BP
SBB     BP,[BX+SI]
ADD     AX,2082
DEC     CX
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AX,[BX+SI]
PUSH    SP
SBB     SI,[BP+SI]
ADD     AX,2082
DEC     DX
OUT     12,AX
AND     AH,CL
AND     [BX],CL
PUSH    CS
ADD     [SI+1B],AH
CMP     AL,05
XCHG    [BX+SI],SP
POP     AX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+SI],AX
JZ      0A34
INC     SI
ADD     AX,2087
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+SI],AX
JL      0A44
PUSH    AX
ADD     AX,2083
DEC     DX
ADD     [SI+5A1B],AL
ADD     AX,2083
DEC     CX
ADD     DH,AH
SBB     SP,[SI+05]
TEST    [BX+SI],AH
XOR     DH,[BP+DI]
SUB     AL,31
XOR     AX,332C
CMP     [SI],CH
XOR     [DI],SI
SUB     AL,35
XOR     CH,[SI]
XOR     [DI],SI
SUB     AL,36
XOR     AL,2C
XOR     [DI],SI
SUB     AL,37
XOR     [SI],CH
XOR     DH,[BX+SI]
SUB     AL,38
CMP     [SI],CH
XOR     [DI],SI
SUB     AL,31
XOR     [BX+SI],DH
SUB     AL,31
XOR     AX,312C
XOR     [BP+SI],SI
SUB     AL,31
XOR     AX,312C
XOR     DH,[SI]
SUB     AL,31
XOR     AX,312C
XOR     SI,[BP+SI]
SUB     AL,31
XOR     AX,312C
XOR     AL,38
SUB     AL,31
XOR     AX,312C
SS:
XOR     [SI],CH
XOR     [DI],SI
SUB     AL,31
AAA
XOR     CH,[SI]
XOR     [DI],SI
SUB     AL,31
CMP     [BP+SI],DH
SUB     AL,31
XOR     AX,4800
SBB     AL,6E
ADD     AX,2084
XOR     DH,[BP+DI]
SUB     AL,33
CMP     [SI],CH
XOR     DI,[BX+SI]
SUB     AL,33
CMP     [SI],CH
XOR     AX,2C32
XOR     DI,[BX+SI]
SUB     AL,36
XOR     AL,2C
XOR     DI,[BX+SI]
SUB     AL,37
XOR     CH,[SI]
XOR     DI,[BX+SI]
SUB     AL,38
AAA
SUB     AL,32
CMP     [SI],CH
XOR     [BX+SI],SI
XOR     [SI],CH
XOR     DI,[BX+SI]
SUB     AL,31
XOR     [BP+SI],SI
SUB     AL,33
CMP     [SI],CH
XOR     [BP+SI],SI
XOR     AL,2C
XOR     DI,[BX+SI]
SUB     AL,31
XOR     SI,[BP+SI]
SUB     AL,33
CMP     [SI],CH
XOR     [SI],SI
CMP     [SI],CH
XOR     DI,[BX+SI]
SUB     AL,31
SS:
XOR     [SI],CH
XOR     SI,[BP+SI]
SUB     AL,31
AAA
XOR     CH,[SI]
XOR     DI,[BX+SI]
SUB     AL,31
CMP     [SI],DH
SUB     AL,33
CMP     [BX+SI],AL
STOSB
SBB     AL,78
ADD     AX,2084
XOR     BH,[BX+DI]
SUB     AL,35
XOR     BP,[SI]
XOR     DI,[BX+DI]
SUB     AL,35
XOR     BP,[SI]
XOR     AX,2C32
XOR     AX,2C33
SS:
XOR     AL,2C
XOR     AX,2C33
AAA
AAA
SUB     AL,35
XOR     BP,[SI]
CMP     [BX+SI],BH
SUB     AL,35
XOR     BP,[SI]
XOR     [BX+SI],SI
XOR     [SI],CH
XOR     AX,2C33
XOR     [BX+DI],SI
XOR     CH,[SI]
XOR     AX,2C33
XOR     [BP+SI],SI
XOR     BP,[SI]
XOR     AX,2C33
XOR     [BP+DI],SI
SS:
SUB     AL,35
XOR     BP,[SI]
XOR     [SI],SI
CMP     [SI],CH
XOR     AX,2C33
XOR     [DI],SI
CMP     [SI],BP
XOR     AX,2C33
XOR     [BX],SI
XOR     CH,[SI]
XOR     AX,2C33
XOR     [BX+SI],DI
XOR     [SI],CH
XOR     AX,0033
OR      AL,1D
ADD     BYTE PTR [DI],84
AND     [BP+SI],DH
AAA
SUB     AL,36
CMP     [SI],BP
XOR     DI,[BX+SI]
SUB     AL,36
CMP     [SI],BP
XOR     AL,38
SUB     AL,36
CMP     [SI],BP
SS:
XOR     [SI],CH
SS:
CMP     [SI],BP
AAA
XOR     CH,[SI]
SS:
CMP     [SI],BP
CMP     [BX+SI],BH
SUB     AL,36
CMP     [SI],BP
XOR     [BX+SI],SI
XOR     [SI],CH
SS:
CMP     [SI],BP
XOR     [BX+DI],SI
XOR     CH,[SI]
SS:
CMP     [SI],BP
XOR     [BP+SI],SI
XOR     AL,2C
SS:
CMP     [SI],BP
XOR     [BP+DI],SI
XOR     CH,[SI]
SS:
CMP     [SI],BP
XOR     [SI],SI
CMP     [SI],CH
SS:
CMP     [SI],BP
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XOR     [DI],SI
CMP     [SI],BP
SS:
CMP     [SI],BP
XOR     [2C38],SI
SS:
CMP     [SI],BP
XOR     [BX+SI],DI
XOR     [SI],CH
SS:
CMP     [BX+SI],AX
DB      6E
SBB     AX,058C
TEST    [BX+SI],AH
XOR     BH,[BX+DI]
SUB     AL,38
XOR     BP,[SI]
XOR     DI,[BX+DI]
SUB     AL,38
XOR     AX,352C
XOR     CH,[SI]
CMP     [DI],DH
SUB     AL,36
XOR     AL,2C
CMP     [DI],DH
SUB     AL,37
AAA
SUB     AL,38
XOR     AX,382C
CMP     [SI],CH
CMP     [DI],DH
SUB     AL,31
XOR     [BX+SI],DH
SUB     AL,38
XOR     AX,312C
XOR     [BP+SI],SI
SUB     AL,38
XOR     AX,312C
XOR     DH,[BP+DI]
SUB     AL,38
XOR     AX,312C
XOR     SI,[382C]
XOR     AX,312C
XOR     AL,33
SUB     AL,38
XOR     AX,312C
XOR     AX,2C39
AAA
CMP     [SI],CH
XOR     [BX],SI
XOR     CH,[SI]
AAA
CMP     [SI],CH
XOR     [BX+SI],DI
XOR     [SI],CH
AAA
CMP     [BX+SI],AL
FICOMP  WORD PTR [DI]
XCHG    SI,AX
ADD     AX,2084
XOR     DH,[BX]
SUB     AL,31
XOR     [BX+DI],DH
SUB     AL,33
CMP     [SI],CH
XOR     [BX+SI],SI
XOR     [SI],BP
XOR     AL,38
SUB     AL,31
XOR     [BX+DI],DH
SUB     AL,36
XOR     [SI],CH
XOR     [BX+SI],SI
XOR     [SI],BP
AAA
XOR     CH,[SI]
XOR     [BX+SI],SI
XOR     [SI],BP
CMP     [BX+SI],BH
SUB     AL,31
XOR     [BX+DI],DH
SUB     AL,31
XOR     [BX+SI],DH
SUB     AL,31
XOR     [BX+DI],DH
SUB     AL,31
XOR     [BP+SI],SI
SUB     AL,31
XOR     [BX+DI],DH
SUB     AL,31
XOR     DH,[SI]
SUB     AL,31
XOR     [BX+DI],DH
SUB     AL,31
XOR     SI,[BP+SI]
SUB     AL,31
XOR     [BX+DI],DH
SUB     AL,31
XOR     AL,38
SUB     AL,31
XOR     [BX+DI],DH
SUB     AL,31
XOR     AX,2C39
XOR     [BX+SI],SI
XOR     [SI],BP
XOR     [BX],SI
XOR     [SI],BP
XOR     [BX+SI],SI
XOR     [SI],BP
XOR     [BX+SI],DI
XOR     [SI],CH
XOR     [BX+SI],SI
XOR     [BX+SI],AX
DEC     SI
PUSH    DS
MOV     AL,[8405]
AND     [BP+SI],DH
AAA
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,33
CMP     [SI],CH
XOR     [BX+DI],SI
XOR     [SI],BP
XOR     AL,38
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,36
XOR     [SI],CH
XOR     [BX+DI],SI
XOR     [SI],BP
AAA
XOR     CH,[SI]
XOR     [BX+DI],SI
XOR     [SI],BP
CMP     [BX+SI],BH
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,31
XOR     [BX+SI],DH
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,31
XOR     [BP+SI],SI
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,31
XOR     DH,[SI]
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,31
XOR     SI,[BP+SI]
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,31
XOR     AL,38
SUB     AL,31
XOR     [BX+DI],SI
XOR     [BX+SI],DH
XOR     [SI],BP
CMP     [BX+SI],BH
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,31
XOR     [BX+SI],DH
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,31
XOR     [BP+SI],SI
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,31
XOR     DH,[SI]
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,31
XOR     SI,[BP+SI]
SUB     AL,31
XOR     [BX+DI],SI
SUB     AL,31
XOR     AL,38
SUB     AL,31
XOR     [BX+DI],SI
XOR     [BX+SI],DH
SUB     AL,31
XOR     [BX+DI],SI
XOR     AX,2C39
XOR     [BX+DI],SI
XOR     [SI],BP
XOR     [2C36],SI
XOR     [BX+DI],SI
XOR     [SI],BP
XOR     [BX+SI],DI
XOR     [SI],CH
XOR     [BX+DI],SI
XOR     [BX+SI],AX
MOV     SI,AA1E
ADD     AX,2084
XOR     DH,[BX]
SUB     AL,31
XOR     SI,[BP+DI]
SUB     AL,33
CMP     [SI],CH
XOR     [BP+SI],SI
XOR     CH,[SI]
XOR     AL,38
SUB     AL,31
XOR     DH,[BP+SI]
SUB     AL,36
XOR     [SI],CH
XOR     [BP+DI],SI
XOR     BP,[SI]
AAA
XOR     CH,[SI]
XOR     [BP+DI],SI
XOR     BP,[SI]
CMP     [BX+SI],BH
SUB     AL,31
XOR     SI,[BP+DI]
SUB     AL,31
XOR     [BX+SI],DH
SUB     AL,31
XOR     SI,[BP+DI]
SUB     AL,31
XOR     [BP+SI],SI
SUB     AL,31
XOR     SI,[BP+DI]
SUB     AL,31
XOR     DH,[SI]
SUB     AL,31
XOR     SI,[BP+DI]
SUB     AL,31
XOR     SI,[BP+SI]
SUB     AL,31
XOR     SI,[BP+DI]
SUB     AL,31
XOR     AL,38
SUB     AL,31
XOR     SI,[BP+DI]
SUB     AL,31
XOR     AX,2C39
XOR     [BP+DI],SI
XOR     BP,[SI]
XOR     [2C37],SI
XOR     [BP+DI],SI
XOR     BP,[SI]
XOR     [BX+SI],DI
XOR     [SI],CH
XOR     [BP+DI],SI
XOR     AX,[BX+SI]
CS:
POP     DS
MOV     AH,05
TEST    [BX+SI],AH
XOR     DH,[BX]
SUB     AL,31
XOR     SI,[BX]
SUB     AL,33
CMP     [SI],CH
XOR     [BP+DI],SI
AAA
```

```
SUB     AL,34
CMP     [SI],CH
XOR     [BP+DI],SI
AAA
SUB     AL,36
XOR     [SI],CH
XOR     [BP+DI],SI
AAA
SUB     AL,37
XOR     CH,[SI]
XOR     [BP+DI],SI
AAA
SUB     AL,38
CMP     [SI],CH
XOR     [BP+DI],SI
AAA
SUB     AL,31
XOR     [BX+SI],DH
SUB     AL,31
XOR     SI,[BX]
SUB     AL,31
XOR     [BP+SI],SI
SUB     AL,31
XOR     SI,[BX]
SUB     AL,31
XOR     DH,[SI]
SUB     AL,31
XOR     SI,[BX]
SUB     AL,31
XOR     SI,[BP+SI]
SUB     AL,31
XOR     SI,[BX]
SUB     AL,31
XOR     AL,38
SUB     AL,31
XOR     SI,[BX]
SUB     AL,31
XOR     AX,2C39
XOR     [BP+DI],SI
AAA
SUB     AL,31
SS:
AAA
SUB     AL,31
XOR     SI,[BX]
SUB     AL,31
CMP     [BX+SI],DH
SUB     AL,31
XOR     SI,[BX]
ADD     [BP+BE1F],BL
ADD     AX,2084
XOR     DH,[SI]
SUB     AL,31
XOR     AX,2C34
XOR     SI,[312C]
XOR     AX,2C34
XOR     AL,38
SUB     AL,31
XOR     AX,2C34
SS:
XOR     [SI],CH
XOR     [DI],SI
XOR     AL,2C
AAA
XOR     CH,[SI]
XOR     [DI],SI
XOR     AL,2C
CMP     [BX+SI],BH
SUB     AL,31
XOR     AX,2C34
XOR     [BX+SI],SI
XOR     [SI],CH
XOR     [DI],SI
XOR     AL,2C
XOR     [BX+SI],SI
AAA
SUB     AL,31
XOR     AX,2C34
XOR     [BP+SI],SI
XOR     AL,2C
XOR     [DI],SI
XOR     AL,2C
XOR     [BP+DI],SI
SS:
SUB     AL,31
XOR     AX,2C34
XOR     [SI],SI
CMP     [SI],CH
XOR     [DI],SI
XOR     AL,2C
XOR     [2C30],SI
XOR     [DI],SI
XOR     AL,2C
XOR     [2C38],SI
XOR     [DI],SI
XOR     AL,2C
XOR     [BX+SI],DI
XOR     [SI],CH
XOR     [DI],SI
XOR     AL,00
PUSH    CS
AND     AL,CL
ADD     AX,2084
XOR     DH,[SI]
SUB     AL,31
AAA
XOR     AX,332C
SS:
SUB     AL,31
AAA
SS:
SUB     AL,34
CMP     [SI],CH
XOR     [BX],SI
SS:
SUB     AL,36
XOR     [SI],CH
XOR     [BX],SI
SS:
SUB     AL,37
XOR     CH,[SI]
XOR     [BX],SI
SS:
SUB     AL,38
CMP     [SI],CH
XOR     [BX],SI
SS:
SUB     AL,31
XOR     [BX+SI],DH
SUB     AL,31
AAA
SS:
SUB     AL,31
XOR     [BP+SI],SI
SUB     AL,31
AAA
SS:
SUB     AL,31
XOR     DH,[BP+DI]
SUB     AL,31
AAA
SS:
SUB     AL,31
XOR     SI,[312C]
AAA
SS:
SUB     AL,31
XOR     AL,38
SUB     AL,31
AAA
SS:
SUB     AL,31
SS:
XOR     [SI],CH
XOR     [BX],SI
SS:
SUB     AL,31
SS:
CMP     [SI],CH
XOR     [BX],SI
SS:
SUB     AL,31
CMP     [BX+SI],DH
SUB     AL,31
AAA
SS:
ADD     [D220],CH
ADD     AX,8F3A
FLDCW   [DI+6F]
DB      6E
DB      65
JNS     0EEE
DB      61
DB      6E
DB      64
AND     [BX+65],DH
DB      6C
DB      66
DB      61
JB      0F3E
AND     [BX+DI+72],AH
JB      0F3F
JNS     0F53
ADD     [BX+20],AL
FADD    QWORD PTR [DI]
XCHG    [BX+SI],AH
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX],CL
OR      CH,[BX+DI]
SUB     AL,4D
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX],CL
OR      CH,[BX+DI]
ADD     [BX+SI+20],BL
OUT     05,AL
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
DB      66
AND     AL,DH
ADD     AX,4557
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
OUT     17,AX
ADD     [SI+FA20],AL
ADD     AX,208B
DEC     CX
OUT     19,AX
AND     CH,CL
AND     [BX+45],DL
DEC     SP
INC     SI
SUB     [BX+DI],BL
SUB     DI,SP
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI],BL
SUB     DX,BP
ADC     AL,[BX+SI]
MOVSW
AND     [SI],AL
PUSH    ES
```

```
MOV     SP,[BX+SI]
DEC     CX
OUT     0F,AX
OR      AH,[BX+SI]
INT     20
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX],CL
OR      CH,[BX+DI]
OUT     57,AX
INC     BP
DEC     SP
INC     SI
SUB     [BX],CL
OR      CH,[BX+DI]
JMP     0F6A
LODSW
AND     [8306],CL
AND     [BX+DI+00],CL
MOV     SP,1820
PUSH    ES
AND     BYTE PTR [BX+SI],49
OUT     12,AX
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
INT     3
AND     [BP+SI],AH
PUSH    ES
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
OUT     0F,AX
DB      64
ADD     CH,CH
AND     [SI],CH
PUSH    ES
MOV     SP,[BX+SI]
DEC     CX
OUT     19,AX
AND     CH,CL
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI],BL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI],BL
SUB     DX,BP
POP     CS
XOR     AL,[BX+SI]
ADC     [BX+DI],SP
SS:
PUSH    ES
MOV     SP,[BX+SI]
DEC     CX
OUT     0F,AX
OR      AH,[BX+SI]
INT     20
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX],CL
OR      CH,[BX+DI]
OUT     4D,AX
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX],CL
OR      CH,[BX+DI]
JMP     41D2
ADD     [BX+DI],BL
AND     [BX+SI+06],AX
AND     WORD PTR [BX+SI],+49
ADD     [4A21],AH
PUSH    ES
XCHG    [BX+SI],AH
PUSH    SI
PUSH    DI
SUB     [BX],CL
OR      CH,[BX+DI]
ADD     [BP+SI],DH
AND     [SI+06],DX
PUSH    SI
PUSH    DI
SUB     [BP+SI],DL
SUB     DI,SP
ADC     AL,00
DS:
AND     [BP+06],BX
PUSH    SI
PUSH    DI
SUB     [BP+DI],DL
SUB     DI,SP
ADC     AL,00
DEC     BP
AND     [BX+SI+06],BP
AND     BYTE PTR [BX+SI],49
OUT     14,AX
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
DB      6C
AND     [DI+06],BP
MOV     SP,[BX+SI]
DEC     CX
OUT     19,AX
AND     CH,CL
AND     [BP+57],DL
SUB     [BX+DI+29],CL
OUT     12,AX
AND     [BP+SI],BH
MOV     AX,[5620]
PUSH    DI
SUB     [BX+DI+29],CL
OUT     13,AX
ADD     [SI+21],DH
JB      1029
AND     WORD PTR [BX+SI],+49
ADD     [BP+7C21],AL
PUSH    ES
XCHG    [BX+SI],AH
PUSH    AX
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
POP     CS
OR      CH,[BX+DI]
ADD     [BP+DI+8621],CH
PUSH    ES
PUSH    AX
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
ADC     CH,[BX+DI]
OUT     22,AX
INC     DI
DEC     DI
PUSH    SI
INC     BP
PUSH    DX
DEC     SI
DEC     BP
INC     BP
DEC     SI
PUSH    SP
AND     [BX+46],CL
INC     SI
DEC     CX
INC     BX
DEC     CX
INC     CX
DEC     SP
AND     AL,[BX+SI]
DB      C9
AND     [BP+DI+5006],CX
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
ADC     BP,[BX+DI]
OUT     22,AX
INC     BX
DEC     CX
PUSH    SP
POP     CX
AND     [BX+SI+4C],DL
INC     CX
DEC     SI
DEC     SI
INC     BP
PUSH    DX
AND     AL,[BX+SI]
JMP     A0A0
PUSH    ES
PUSH    AX
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
ADC     AL,29
OUT     22,AX
DEC     SP
INC     CX
DEC     SI
INC     SP
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
INC     BP
PUSH    DX
AND     AL,[BX+SI]
OR      SP,[BP+SI]
CALL    414C:5006
POP     CX
INC     BP
PUSH    DX
AND     AL,28
ADC     AX,E729
AND     AL,[DI+4E]
PUSH    SI
DEC     CX
PUSH    DX
DEC     DI
DEC     SI
DEC     BP
INC     BP
DEC     SI
```

```
PUSH    SP
INC     CX
DEC     SP
DEC     CX
PUSH    BX
PUSH    SP
AND     AL,[BX+SI]
CS:
AND     BL,[BX+5006]
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
PUSH    SS
SUB     DI,SP
AND     CL,[SI+41]
DEC     SI
INC     SP
AND     [BX+57],CL
DEC     SI
INC     BP
PUSH    DX
DAS
INC     SI
INC     CX
PUSH    DX
DEC     BP
INC     BP
PUSH    DX
AND     AL,[BX+SI]
DEC     SI
AND     AH,[SI+5006]
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
POP     SS
SUB     DI,SP
AND     DL,[BP+DI+4D]
INC     CX
DEC     SP
DEC     SP
AND     [BP+SI+55],AL
PUSH    BX
DEC     CX
DEC     SI
INC     BP
PUSH    BX
PUSH    BX
AND     AL,[BX+SI]
DB      6C
AND     CH,[BP+5006]
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
SBB     [BX+DI],CH
OUT     22,AX
INC     DX
DEC     CX
INC     DI
AND     [BP+SI+55],AL
PUSH    BX
DEC     CX
DEC     SI
INC     BP
PUSH    BX
PUSH    BX
AND     AL,[BX+SI]
NOP
AND     DH,[BP+DI+5006]
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
SBB     [BX+DI],BP
OUT     22,AX
DEC     SP
DEC     DI
PUSH    DI
AND     [BX+DI+4E],CL
INC     BX
DEC     DI
DEC     BP
INC     BP
AND     [BP+DI+49],AL
PUSH    SP
DEC     CX
POP     DX
INC     BP
DEC     SI
AND     AL,[BX+SI]
MOV     BH,22
MOV     AX,5006
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
SBB     CH,[BX+DI]
OUT     22,AX
DEC     BP
DEC     CX
INC     SP
INC     SP
DEC     SP
INC     BP
AND     [BX+DI+4E],CL
INC     BX
DEC     DI
DEC     BP
INC     BP
AND     [BP+DI+49],AL
PUSH    SP
DEC     CX
POP     DX
INC     BP
DEC     SI
AND     AL,[BX+SI]
FRSTOR  [BP+SI]
RET     5006
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
POP     CS
OR      CH,[BX+DI]
OUT     22,AX
DEC     AX
DEC     CX
INC     DI
DEC     AX
AND     [BX+DI+4E],CL
INC     BX
DEC     DI
DEC     BP
INC     BP
AND     [BP+DI+49],AL
PUSH    SP
DEC     CX
POP     DX
INC     BP
DEC     SI
AND     AL,[BX+SI]
CLC
AND     CL,AH
PUSH    ES
CMP     CL,[BX+71D9]
JNZ     11FB
DB      6C
AND     [BX+66],CH
AND     [SI+69],CH
DB      66
DB      65
AND     [BP+61],DH
DB      6C
JNZ     120E
JNB     11AB
ADD     AL,23
DB      D6
PUSH    ES
XCHG    [BX+SI],AH
PUSH    CX
DEC     SP
SUB     [BX+SI],BL
SUB     [BX+SI],AX
ADC     [BP+DI],AH
LOOPNZ  11C1
PUSH    CX
DEC     SP
SUB     [BP+SI],DL
SUB     DI,SP
ADC     AL,00
SBB     AL,23
IN      AX,06
PUSH    CX
DEC     SP
SUB     [BP+DI],DL
SUB     DI,SP
ADC     AX,[BX+SI]
SUB     [BP+DI],AH
JMP     284C:5106
ADC     AL,29
OUT     13,AX
ADD     [SI],DH
AND     BP,DI
PUSH    ES
PUSH    CX
DEC     SP
SUB     [DI],DL
SUB     DI,SP
ADC     AL,[BX+SI]
INC     AX
AND     SI,SP
PUSH    ES
PUSH    CX
DEC     SP
SUB     [E729],DL
ADC     AL,[BX+SI]
DEC     SP
AND     DI,CX
PUSH    ES
PUSH    CX
DEC     SP
SUB     [BX],DL
SUB     DI,SP
ADC     AL,00
POP     AX
AND     DI,SI
PUSH    ES
PUSH    CX
DEC     SP
SUB     [BX+SI],BL
SUB     DI,SP
ADC     AL,[BX+SI]
XCHG    [BP+DI],SP
OR      [BX],AL
CMP     CL,[BX+53D9]
INC     BP
PUSH    SP
AND     [BX+SI+4F],DL
PUSH    AX
PUSH    BP
```

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DEC     SP
INC     CX
PUSH    SP
DEC     CX
DEC     DI
DEC     SI
AND     [BX+DI+4E],AL
INC     SP
AND     [BP+41],DL
INC     BX
INC     CX
DEC     SI
INC     BX
POP     CX
AND     [BX+DI+54],AL
AND     [BP+SI+45],AL
INC     DI
DEC     CX
DEC     SI
DEC     SI
DEC     CX
DEC     SI
INC     DI
ADD     [BX+DI+1223],DL
POP     ES
PUSH    SI
INC     BX
OUT     0F,AX
OR      AL,00
LAHF
AND     BX,[SI]
POP     ES
PUSH    AX
DEC     DI
PUSH    AX
OUT     1D,AX
ADD     [SI],AL
ES:
XCHG    CX,AX
ADD     [DI+D023],CH
POP     ES
INC     SI
DEC     DI
PUSH    DX
DEC     BP
INC     CX
PUSH    SP
AND     [BP+DI+3A],AL
ADD     [BP+DI+C423],DH
OR      [SI+DD00],DX
AND     SI,AX
OR      AL,AL
CMP     AH,[BX+SI]
XCHG    CX,AX
AND     [BP+SI],AH
INC     BX
DEC     DI
PUSH    AX
POP     CX
PUSH    DX
DEC     CX
INC     DI
DEC     AX
PUSH    SP
CMP     AH,[BX+SI]
PUSH    BX
PUSH    BP
PUSH    BX
INC     CX
DEC     SI
AND     [DI+4C],AL
PUSH    BX
DEC     AX
INC     CX
PUSH    DI
AND     [SI+48],DL
PUSH    DX
INC     CX
DEC     SP
DEC     SP
AND     AL,[BX+SI]
JCXZ    12B5
MOV     AX,940B
ADD     BH,DH
AND     CX,[BP+SI+3A0C]
POP     CX
DB      69
DB      6E
JNB     1315
JB      1318
DB      63
JZ      130F
DB      6F
DB      6E
JNB     12AA
STD
AND     CX,[BX+C00C]
ADD     [BP+DI+24],AL
XCHG    SP,AX
OR      AL,91
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
POP     CX
DB      6F
JNZ     12DF
JA      132A
DB      6C
DB      6C
AND     [BP+6F],CH
JA      12E8
DB      62
DB      65
AND     [BX+SI+72],DH
DB      65
JNB     1335
DB      6E
JZ      1338
DB      64
AND     [BX+69],DH
JZ      1341
AND     [SI+68],DH
DB      65
AND     [BX+61],AH
DB      6D
DB      65
AND     [DI+65],CH
DB      6E
JNZ     1316
AND     [BX+6E],CL
AND     [SI+68],DH
DB      65
AND     [BX+61],AH
DB      6D
DB      65
AND     AL,[BX+SI]
DB      60
AND     AL,9E
OR      AL,91
AND     CH,[DI+65]
DB      6E
JNZ     1321
DB      61
JB      1369
AND     [BP+DI+69],DH
JS      1329
DB      63
DB      68
DB      6F
DB      69
DB      63
DB      65
JNB     133F
AND     AL,[BX+SI]
LODSB
AND     AL,A8
OR      AL,91
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
INC     BX
DB      68
DB      6F
DB      69
DB      63
DB      65
AND     [BX+DI],DH
AND     [BX+SI+72],DH
DB      65
JNB     1391
DB      6E
JZ      13A2
AND     [BX+DI+20],AH
DB      6D
DB      61
JO      1356
DB      6F
DB      66
AND     [SI+68],DH
DB      65
AND     [BP+DI+69],AH
JZ      13BA
AND     [BP+DI+68],DH
DB      6F
JA      13B0
DB      6E
DB      67
AND     [BP+DI+75],AH
JB      13C0
DB      65
DB      6E
JZ      1372
DB      6C
DB      61
DB      6E
DB      64
AND     [DI+73],DH
DB      65
AND     [BP+SI+79],AH
AND     AL,[BX+SI]
STI
AND     AL,B2
OR      AL,91
AND     AH,[BP+DI+6F]
DB      6C
DB      6F
JB      138B
DB      63
DB      6F
DB      64
DB      65
CS:
AND     [SI+68],DL
DB      65
AND     [DI+61],CH
JO      1399
DB      69
JNB     139C
DB      6F
JBE     13E4
JB      13ED
DB      61
DB      69
DB      64
AND     [BP+SI+79],AH
AND     [BX+DI+20],AH
DB      67
JB      13F6
DB      64
AND     [SI+61],CH
DB      62
DB      65
DB      6C
DB      65
```

```
DB      64
AND     [BP+SI+79],AH
AND     [SI+65],CH
JZ      1412
DB      65
JB      13C1
DB      61
DB      6E
DB      64
AND     [BP+75],CH
DB      6D
DB      62
DB      65
JB      13DA
AND     AL,[BX+SI]
DEC     AX
AND     AX,0CBC
XCHG    CX,AX
AND     DL,[BP+DI+74]
JNZ     141C
JNS     13DA
JZ      1424
DB      65
AND     [DI+61],CH
JO      13E2
DB      63
DB      61
JB      142B
DB      66
JNZ     1435
DB      6C
JNS     13EC
DB      61
DB      6E
DB      64
AND     [SI+65],AH
DB      63
DB      69
DB      64
DB      65
AND     [BX+68],DH
DB      61
JZ      13FC
JNS     144D
JNZ     1400
JA      1443
DB      6E
JZ      1405
JZ      1456
AND     [SI+6F],AH
AND     [BX+69],DH
JZ      1457
AND     [SI+68],DH
DB      65
AND     [SI+61],CH
DB      6E
DB      64
AND     [BP+SI],AH
ADD     [BP+SI+C625],DL
OR      AL,91
AND     CH,[BX+DI+6E]
AND     [BX+DI+20],AH
JO      1469
JB      147E
DB      69
DB      63
JNZ     147A
DB      61
JB      1431
DB      63
DB      65
DB      6C
DB      6C
SUB     AL,20
DB      66
DB      6F
JB      143B
DB      65
JS      147F
DB      6D
JO      148D
DB      65
AND     [BX+DI+6F],BH
JNZ     1447
DB      6D
DB      61
JNS     144B
DB      64
DB      65
DB      63
DB      69
DB      64
DB      65
AND     [SI+6F],DH
AND     [SI+65],AH
JBE     149E
DB      6C
DB      6F
JO      145D
JNB     14A8
DB      6E
DB      67
DB      6C
DB      65
AND     AL,[BX+SI]
FBLD    TBYTE PTR [DI]
ROR     BYTE PTR [SI],1
XCHG    CX,AX
AND     AH,[BP+61]
DB      6D
DB      69
DB      6C
JNS     1472
DB      68
DB      6F
JNZ     14C9
DB      69
DB      6E
DB      67
AND     [BX+DI+6E],CH
AND     [BP+DI+65],AH
DB      6C
DB      6C
AND     [SI+34],AL
CS:
AND     [SI+6F],DL
AND     [BP+DI+65],DH
DB      65
AND     [SI+68],DH
DB      65
AND     [SI+69],CH
JNB     14E9
AND     [BX+66],CH
AND     [BX+SI+6F],DH
JNB     14F0
DB      69
DB      62
DB      6C
DB      65
AND     [BP+DI+68],AH
DB      6F
DB      69
DB      63
DB      65
JNB     14AA
JNB     14F1
DB      6C
DB      65
DB      63
JZ      14B3
ADD     [DI],CH
ES:
FIMUL   DWORD PTR [SI]
XCHG    CX,AX
AND     AH,[BP+DI+68]
DB      6F
DB      69
DB      63
DB      65
AND     [BP+DI],DH
AND     [BX+6E],CH
AND     [SI+68],DH
DB      65
AND     [BX+61],AH
DB      6D
DB      65
AND     [DI+65],CH
DB      6E
JNZ     14E0
AND     [BX+DI+6F],BL
JNZ     14D7
DB      6D
DB      61
JNS     14DB
DB      63
DB      68
DB      61
DB      6E
DB      67
DB      65
AND     [BX+DI+6E],AH
JNS     14E6
DB      63
DB      65
DB      6C
DB      6C
AND     [BP+72],AH
DB      6F
DB      6D
AND     [BP+DI+75],AH
JB      1546
DB      65
DB      6E
JZ      14F8
JNZ     154D
DB      65
AND     [BX+72],CH
AND     AL,[BX+SI]
PUSH    DI
ES:
IN      AL,0C
XCHG    CX,AX
AND     AH,[BX]
DB      69
DB      6E
DB      66
DB      69
DB      6C
DB      6C
DAA
AND     [BX+DI+20],AH
DB      63
DB      65
DB      6C
DB      6C
AND     [BX+69],DH
JZ      1562
AND     [SI+68],DH
DB      65
AND     [BP+DI+61],DH
DB      6D
DB      65
AND     [DI+73],DH
DB      65
CS:
AND     AL,[BX+SI]
MOV     [EE26],AX
OR      AL,91
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
DEC     DI
DB      6E
DB      65
```

```
AND     [BX+72],AH
DB      6F
JNZ     158E
AND     [BP+DI+68],AH
DB      6F
JNB     1589
DB      6E
AND     [BP+SI+79],AH
AND     [BP+DI+6F],AH
DB      6D
JO      15A3
JZ      1595
JB      1552
JA      159D
DB      6C
DB      6C
AND     [BX+6F],AH
AND     [BP+69],AH
JB      15B1
JZ      1560
DB      69
DB      6E
AND     [BX+SI+72],DH
DB      65
JNB     15AD
DB      6E
JZ      15B4
DB      6E
DB      67
AND     [SI+6F],DH
AND     [SI+68],DH
DB      65
AND     AL,[BX+SI]
JMP     157E
CLC
OR      AL,91
AND     CH,[BX+74]
DB      68
DB      65
JB      15D5
AND     [BX+DI+74],CH
JNB     1587
DB      63
DB      68
DB      6F
DB      69
DB      63
DB      65
AND     [BX+66],CH
AND     [SI+61],CH
DB      6E
DB      64
AND     [DI+73],DH
DB      65
CS:
AND     [BX+DI+6C],AL
DB      6C
AND     [BX+SI+6C],DH
DB      61
JNS     15E9
JB      15F9
AND     [SI+69],AH
JNB     15EE
JNZ     1600
JNB     15AF
JZ      15F9
DB      65
AND     [DI+65],CH
JB      1600
JZ      160C
AND     [BX+72],CH
AND     AL,[BX+SI]
AAA
DAA
ADD     CL,[DI]
XCHG    CX,AX
AND     AH,[SI+72]
DB      61
JA      160B
DB      61
DB      63
DB      6B
JNB     15CE
DB      6F
DB      66
AND     [SI+68],DH
DB      69
JNB     15D6
DB      63
DB      68
DB      6F
DB      69
DB      63
DB      65
CS:
AND     [BX+DI+74],AL
AND     [SI+68],DH
DB      65
AND     [DI+6E],AH
DB      64
AND     [BX+66],CH
AND     [SI+68],DH
DB      65
AND     [SI+69],AH
JNB     1637
JNZ     1649
JNB     1641
DB      6F
DB      6E
AND     [BX+SI+6C],DH
DB      61
JNS     1645
JB      1655
AND     [BP+6F],DH
JZ      164C
AND     [BP+SI],AH
ADD     [BP+0C27],AL
OR      AX,2291
DB      66
DB      6F
JB      1614
DB      6F
JB      1617
DB      61
DB      67
DB      61
DB      69
DB      6E
JNB     1672
AND     [SI+68],DH
DB      65
AND     [BP+DI+68],AH
DB      6F
DB      69
DB      63
DB      65
CS:
AND     [BP+DI+69],DL
DB      6E
DB      63
DB      65
AND     [BP+6F],DH
JZ      167A
JNB     1637
DB      61
JB      167F
AND     [BX+65],DH
DB      69
DB      67
DB      68
JZ      1687
DB      64
SUB     AL,20
JNS     1696
JNZ     1649
DB      6D
JNZ     169F
JZ      164E
DB      61
DB      6C
DB      6C
DB      6F
JA      1654
JZ      169E
DB      65
AND     AL,[BX+SI]
DB      C8
DAA
PUSH    SS
OR      AX,2291
DB      63
DB      6F
DB      6D
JO      16B9
JZ      16AB
JB      1668
JZ      16B9
AND     [SI+61],DH
DB      6C
DB      6C
JNS     1671
JZ      16BB
DB      65
AND     [BP+6F],DH
JZ      16BE
AND     [BP+SI+79],AH
AND     [BP+DI+68],AH
DB      6F
DB      6F
JNB     16CC
DB      6E
DB      67
AND     [DI],DH
AND     [BX+6E],CH
AND     [SI+68],DH
DB      65
AND     [BX+61],AH
DB      6D
DB      65
AND     [DI+65],CH
DB      6E
JNZ     16A7
AND     AL,[BX+SI]
ADC     AX,2028
OR      AX,2291
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [SI+68],DL
DB      65
AND     [BP+DI+6F],AH
DB      6D
JO      1704
JZ      16F6
JB      16B3
JA      16FE
DB      6C
DB      6C
AND     [SI+61],DH
DB      6C
DB      6C
JNS     16BE
JBE     170F
JZ      1707
JNB     16D0
AND     [DI+61],CH
DB      6B
DB      65
AND     [BP+DI+68],AH
DB      61
DB      6E
DB      67
DB      65
JNB     16D2
DB      69
```

```
DB      6E
AND     [SI+68],DH
DB      65
AND     [DI+61],CH
JO      16E9
AND     [BX+DI+6E],AH
DB      64
AND     [DI+61],CH
DB      6B
DB      65
AND     AL,[BX+SI]
DB      62
SUB     [BP+SI],CH
OR      AX,2291
DB      61
DB      64
DB      6A
JNZ     1746
JZ      1742
DB      65
DB      6E
JZ      174C
AND     [BX+DI+6E],CH
AND     [DI+61],AH
DB      63
DB      68
AND     [BX+SI+65],DH
JB      1759
DB      6F
DB      6E
DAA
JNB     170B
JZ      175C
JZ      1750
DB      6C
AND     [BX+DI+73],AH
JNB     175A
JZ      176A
CS:
AND     [BX+SI+6C],DL
DB      61
JNS     171E
DB      63
DB      6F
DB      6E
JZ      176C
DB      6E
JNZ     176B
JNB     1728
DB      66
DB      6F
JB      172C
JNB     1773
JBE     1775
JB      1773
DB      6C
AND     AL,[BX+SI]
LODSW
SUB     [SI],DH
OR      AX,2291
JB      178C
JNZ     178D
DB      64
JNB     1742
JA      178D
JZ      178E
AND     [BX+DI+6C],AH
DB      6C
AND     [BX+72],AH
DB      6F
JNZ     17A0
JNB     1752
DB      67
DB      65
JZ      17AA
DB      69
DB      6E
DB      67
AND     [BX+DI+20],AH
DB      63
DB      68
DB      61
DB      6E
DB      63
DB      65
AND     [SI+6F],DH
AND     [BX+SI+72],DH
DB      65
JNB     17B0
DB      6E
JZ      176E
JZ      17B8
DB      65
DB      69
JB      1774
DB      63
DB      68
DB      6F
DB      69
DB      63
DB      65
SUB     [BP+DI+29],DH
CS:
AND     AL,[BX+SI]
SHR     BYTE PTR [BX+SI],1
DS:
OR      AX,2291
INC     DI
JB      17D8
JNZ     17DB
JNB     178D
DB      6D
DB      61
JNS     1791
DB      67
DB      6F
AND     [BX+DI+6E],CH
AND     [BX+DI+6E],AH
JNS     179B
DB      6F
JB      17E2
DB      65
JB      17AF
AND     AL,[BX+SI]
FLD     TBYTE PTR [BX+SI]
DEC     AX
OR      AX,20CA
POP     CS
PUSH    SS
SUB     AL,12
ADD     [BX+DI],AL
SUB     [BP+SI+0D],DX
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     BP,[BX+DI]
AND     DL,[BX+SI+52]
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [SI+4F],DL
AND     [BP+DI+4F],AL
DEC     SI
PUSH    SP
DEC     CX
DEC     SI
PUSH    BP
INC     BP
AND     AL,[BX+SI]
OR      AL,29
POP     SP
OR      AX,2088
INC     CX
AND     AL,37
FIADD   WORD PTR [BX+SI]
PUSH    DS
SUB     [BP+0D],SP
MOV     SP,[BX+SI]
INC     CX
AND     AL,E7
AND     AH,[BP+SI]
AND     CH,CL
AND     [0D5C],CL
ADD     [SI],AH
SUB     [BP+DI+0D],BP
DB      C0
ADD     [BP+DI+29],DH
JO      17E8
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
PUSH    AX
DB      6C
DB      61
JNS     184C
JB      185C
AND     [DI+61],CH
JNS     180E
JNB     1855
DB      65
AND     [SI+68],DH
DB      65
AND     [DI+61],CH
JO      181A
SUB     [BP+DI+68],AH
DB      6F
DB      69
DB      63
DB      65
AND     [BX+DI],DH
SUB     [SI],BP
AND     [SI+68],DH
DB      65
AND     [SI+61],DH
DB      62
DB      6C
DB      65
AND     [BX+66],CH
AND     [BX+DI+73],AH
JNB     187C
JZ      188C
AND     [BX+SI],CH
DB      63
DB      68
DB      6F
DB      69
DB      63
DB      65
AND     [BP+SI],DH
SUB     [BP+SI],SP
ADD     AL,AL
SUB     [BP+SI+0D],DI
XCHG    CX,AX
AND     CH,[BX+72]
AND     [SI+68],DH
DB      65
AND     [BX+61],AH
DB      6D
DB      65
AND     [BP+DI+68],AH
DB      6F
DB      69
DB      63
DB      65
JNB     1860
SUB     [BP+DI+68],AH
DB      6F
DB      69
DB      63
```

```
DB      65
AND     [BP+DI],DH
SUB     [BX+SI],SP
DB      61
JZ      186E
DB      61
DB      6E
JNS     1872
JZ      18BD
DB      6D
DB      65
CS:
AND     [BP+DI+68],AL
DB      6F
DB      69
DB      63
DB      65
AND     [SI],DH
AND     [BX+6E],CH
AND     [SI+68],DH
DB      65
AND     [BX+61],AH
DB      6D
DB      65
AND     [DI+65],CH
DB      6E
JNZ     1894
ADD     [DI],CL
SUB     AL,[SI+910D]
AND     DH,[BX+69]
DB      6C
DB      6C
AND     [BP+DI+68],DH
DB      6F
JA      18A3
DB      61
DB      64
DB      64
DB      69
JZ      18F2
DB      6F
DB      6E
DB      61
DB      6C
AND     [BX+70],CH
JZ      18FB
DB      6F
DB      6E
JNB     18B6
DB      69
DB      6E
AND     [SI+61],CH
DB      6E
DB      64
AND     [DI+73],DH
DB      65
AND     [BP+SI+75],AH
JZ      18C6
DB      63
DB      61
DB      6E
AND     [BX+6E],CH
DB      6C
JNS     18CF
DB      62
DB      65
AND     [DI+73],DH
DB      65
DB      64
AND     [BX+DI+66],AH
JZ      1920
JB      18DD
XOR     SP,[BP+SI]
ADD     [BX+DI+2A],BL
MOV     [DI],CX
XCHG    CX,AX
AND     DH,[BP+SI+6F]
JNZ     1938
DB      64
JNB     18ED
DB      68
DB      61
JBE     1936
AND     [BP+SI+65],AH
DB      65
DB      6E
AND     [BP+DI+6F],AH
DB      6D
JO      1948
DB      65
JZ      1944
DB      64
CS:
AND     [BP+DI+68],AL
DB      6F
DB      69
DB      63
DB      65
AND     [DI],DH
AND     [BX+DI+6C],AH
DB      6C
DB      6F
JA      1964
AND     [BX+SI+6C],DH
DB      61
JNS     195C
JB      196C
AND     [SI+6F],DH
AND     [BP+6F],DH
JZ      1966
CS:
AND     [BP+DI+68],AL
DB      6F
DB      69
DB      63
DB      65
AND     [BP+SI],AH
ADD     [DI+8E2A],AH
OR      AX,2291
SS:
AND     [BX+DI+6C],AH
DB      6C
DB      6F
JA      198D
AND     [BX+DI+6F],BH
JNZ     193F
JZ      1990
AND     [BP+DI+65],DH
DB      65
AND     [SI+68],DH
DB      65
JNB     1990
AND     [BX+DI+6E],CH
JNB     19A4
JB      19A7
DB      63
JZ      199E
DB      6F
DB      6E
JNB     1959
DB      61
JZ      195C
DB      61
DB      6E
JNS     1960
JZ      19AB
DB      6D
DB      65
CS:
AND     [BX+68],DL
DB      65
DB      6E
AND     [SI+68],DH
DB      65
AND     [BX+61],AH
DB      6D
DB      65
AND     [BX+DI+73],CH
AND     AL,[BX+SI]
INT     2A
XCHG    BX,AX
OR      AX,2291
DB      63
DB      6F
DB      6D
JO      19CF
DB      65
JZ      19CB
DB      64
SUB     AL,20
DB      63
DB      68
DB      6F
DB      6F
JNB     19D4
AND     [BX+SI],DH
AND     [SI+6F],DH
AND     [DI+6E],AH
DB      64
AND     [BP+DI+55],DL
DEC     SP
PUSH    BP
CS:
AND     AL,[BX+SI]
XLAT
SUB     DL,[DI+910D]
CMP     DL,[BX+DI+913A]
ADD     CL,CH
SUB     DL,[BP+8B0D]
AND     [BP+DI-19],AL
ADC     [BX+SI],SP
INT     20
LEA     SP,[BX+SI]
PUSH    CS
MOV     AL,0E
ADD     AH,DH
SUB     BL,[BX+SI+CA0D]
AND     [BX],CL
PUSH    SS
SUB     AL,12
ADD     [BX+SI],AH
SUB     BX,[BP+SI+910D]
AND     DH,CL
POP     CS
SBB     [BX+DI],CH
CMP     SP,[BP+SI]
PUSH    AX
PUSH    DX
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [SI+4F],DL
AND     [BP+DI+45],DL
INC     BP
AND     [BX+41],AL
DEC     BP
INC     BP
AND     [DI+45],CL
DEC     SI
PUSH    BP
AND     AL,[BX+SI]
SUB     BP,[BP+DI]
PUSHF
OR      AX,2088
INC     CX
AND     AL,E7
FIADD   WORD PTR [BX+SI]
CMP     AL,2B
POPF
OR      AX,208B
```

```
INC     CX
AND     AL,E7
AND     AH,[BP+SI]
INT     20
PUSH    CS
PUSHF
OR      AX,4200
SUB     BP,[SI+C00D]
ADD     [BP+DI+2B],DL
MOV     DH,0D
CMP     CL,[BX+67D9]
DB      61
DB      6D
DB      65
AND     [DI+65],CH
DB      6E
JNZ     1A06
POP     CX
SUB     AX,AX
OR      AX,00C0
DB      64
SUB     DX,SP
OR      AX,20CA
ADC     AX,0F2C
SBB     AL,[BX+SI]
JLE     1A44
FIMUL   WORD PTR [DI]
AND     BYTE PTR [BX+SI],49
OUT     12,AX
AND     AH,CL
AND     [BX],CL
SBB     DI,[BP+SI]
XCHG    CX,AX
AND     [BP+SI],AH
SUB     AH,[BP+SI]
CMP     DI,[BP+SI]
AND     WORD PTR [BX+SI],+49
ADD     [SI+E82B],AL
OR      AX,0091
PUSHF
SUB     SI,DX
OR      AX,2091
INTO
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
CMP     CX,SI
POP     CS
XOR     AL,29
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
ADD     [SI+FC2B],DH
OR      AX,2091
INTO
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
CMP     CX,SI
POP     CS
XOR     AL,29
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
ADD     AL,BL
SUB     AX,[910E]
AND     DH,CL
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BX+SI]
XOR     [4320],BP
DEC     CX
PUSH    SP
POP     CX
AND     [DI+41],CL
PUSH    AX
AND     BH,[BP+DI]
INTO
POP     CS
XOR     AL,29
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
ADD     [BX+DI],AL
SUB     AL,10
PUSH    CS
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BX+SI]
XOR     CH,[5020]
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     [BX+DI+53],AL
PUSH    BX
INC     BP
PUSH    SP
PUSH    BX
AND     BH,[BP+DI]
INTO
POP     CS
XOR     AL,29
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
ADD     [BX+DI],CH
SUB     AL,1A
PUSH    CS
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BX+SI]
XOR     BP,[4720]
INC     CX
DEC     BP
INC     BP
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
PUSH    BX
AND     BH,[BP+DI]
INTO
POP     CS
XOR     AL,29
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
ADD     [BX+2C],DL
AND     AL,0E
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BX+SI]
XOR     AL,2E
AND     [BX+54],CL
DEC     AX
INC     BP
PUSH    DX
AND     [BX+41],AL
DEC     BP
INC     BP
AND     [BX+50],CL
PUSH    SP
DEC     CX
DEC     DI
DEC     SI
PUSH    BX
AND     BH,[BP+DI]
INTO
POP     CS
XOR     AL,29
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
ADD     [BX+DI+2C],BH
CS:
PUSH    CS
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BX+SI]
XOR     AX,202E
PUSH    SI
DEC     DI
PUSH    SP
DEC     CX
DEC     SI
INC     DI
AND     BH,[BP+DI]
INTO
POP     CS
XOR     AL,29
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
ADD     [BX+DI+332C],AH
PUSH    CS
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BX+SI]
SS:
CS:
AND     [BX+DI+4E],CL
PUSH    BX
PUSH    SP
PUSH    DX
PUSH    BP
INC     BX
PUSH    SP
DEC     CX
DEC     DI
DEC     SI
PUSH    BX
AND     BH,[BP+DI]
INTO
POP     CS
XOR     AL,29
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
ADD     [BX+DI+382C],BH
PUSH    CS
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
CMP     CX,SI
POP     CS
XOR     AL,29
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
ADD     DL,AH
SUB     AL,42
PUSH    CS
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BX+SI]
XOR     [4520],CH
```

```
POP     AX
DEC     CX
PUSH    SP
AND     [BP+DI+55],DL
DEC     SP
PUSH    BP
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
SUB     AH,[BP+SI]
ADD     DL,BH
SUB     AL,4C
PUSH    CS
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
CMP     CX,SI
POP     CS
XOR     AL,29
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
ADD     [562D],AL
PUSH    CS
RETF    0F20
ADC     [SI],CH
POP     CS
SBB     AL,[BX+SI]
POP     DS
SUB     AX,0E60
AND     BYTE PTR [BX+SI],49
OUT     12,AX
AND     AH,CL
AND     [BX],CL
SBB     DI,[BP+SI]
XCHG    CX,AX
AND     CH,[BP+SI]
AND     BH,[BP+DI]
CMP     AL,[BP+DI+4920]
ADD     [BX+DI],CH
SUB     AX,0E6A
XCHG    CX,AX
CMP     DL,[BX+DI+913A]
ADD     [BP+SI+2D],CH
JZ      1BEE
TEST    [BX+SI],SP
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
INC     BP
DEC     SI
PUSH    SP
INC     BP
PUSH    DX
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     [BP+SI+59],AL
AND     [BP+55],CL
DEC     BP
INC     DX
INC     BP
PUSH    DX
AND     BH,[BP+DI]
INC     DI
DEC     BP
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
ADD     [BP+SI+7E2D],DL
PUSH    CS
MOV     SP,[BX+SI]
INC     DI
DEC     BP
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,CH
ADC     [BX+SI],SP
OUT     DX,AX
AND     [BX+4D],AL
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     DH,AH
POP     SS
AND     CH,CL
AND     [BX+DI+0E20],CL
PUSH    SI
PUSH    CS
ADD     [DI+802D],CH
PUSH    CS
INC     DI
DEC     BP
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     BH,AH
INC     WORD PTR [DI+4728]
DEC     BP
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
SUB     [BX+SI],AX
DB      D6
SUB     AX,0E83
XCHG    BP,AX
AND     [BX+4D],AL
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     [DI+0E20],CL
ADC     [BX],AH
SUB     AL,0E
IN      AL,DX
PUSH    CS
SUB     AL,0E
DB      D6
ADC     [SI],CH
PUSH    CS
ADD     DL,[BP+SI]
SUB     AL,0E
XCHG    DX,AX
ADC     BP,[SI]
PUSH    CS
MOV     CL,[SI]
ADD     DL,DH
SUB     AX,0E88
MOV     SP,[BX+SI]
INC     DI
DEC     BP
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,CH
OUT     20,AL
ADC     [BX+SI],SP
INT     20
MOV     [BX+SI],SP
PUSH    CS
DB      C0
OR      AX,FC00
SUB     AX,0E92
LEA     SP,[BX+SI]
PUSH    CS
ADC     [BX],AH
ADD     [DI],CL
CS:
XCHG    DI,AX
PUSH    CS
PUSH    BX
PUSH    DI
XOR     DH,[BX+SI]
OUT     12,AX
CMP     CL,[DI+0E20]
ADC     [BX],AH
ADD     [BX+DI],BL
CS:
CWD
PUSH    CS
RETF    0F20
OR      AL,2C
POP     CS
SBB     AL,00
CMP     [0E9A],BP
XCHG    CX,AX
AND     DL,[SI+48]
INC     CX
DEC     SI
DEC     BX
AND     [BX+DI+4F],BL
PUSH    BP
AND     [BP+4F],AL
PUSH    DX
AND     [DI+53],DL
DEC     CX
DEC     SI
INC     DI
AND     [BP+DI+55],DL
DEC     SP
PUSH    BP
AND     AL,[BX+SI]
AAS
CS:
PUSHF
PUSH    CS
ADD     WORD PTR [BX+SI],2E59
MOV     AL,0E
CMP     CL,[BX+72D9]
DB      61
DB      6E
DB      64
DB      6F
DB      6D
AND     [BP+69],AH
JB      1D77
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JZ      1D26
DB      67
JB      1D78
JNZ     1D7B
ADD     [SI+2E],CH
MOV     DX,B90E
AND     BH,BH
XCHG    SP,AX
SUB     BH,BH
SUB     BYTE PTR [BX+SI],FE
MOV     CS,[SI]
ADC     BP,[BX+DI]
SUB     [BX+SI],AX
SUB     BYTE PTR [0EC4],88
AND     [BP+55],CL
DEC     BP
OUT     FF,AX
TEST    [BX+SI],BP
DEC     WORD PTR [BX+SI+0FEB]
OR      CH,CL
ADC     CH,[BX+DI]
ADD     [BX+CE2E],AH
PUSH    CS
RETF    0F20
POP     CS
SUB     AL,28
SUB     [BX],CL
PUSH    AX
JMP     2892:FF28
PUSH    AX
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
DEC     SI
PUSH    BP
DEC     BP
SUB     [BX+DI],BP
SUB     [BX+DI],BP
IN      AL,DX
ADC     BP,[BX+DI]
ADD     BL,CL
CS:
FMUL    DWORD PTR [2091]
PUSH    AX
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
DEC     SI
PUSH    BP
DEC     BP
SUB     [BP+DI],DI
AND     AH,[BX+SI]
PUSH    DI
DEC     CX
DEC     SP
DEC     SP
AND     [BX+4F],AL
AND     [BP+49],AL
PUSH    DX
PUSH    BX
PUSH    SP
AND     AL,[BX+SI]
SHR     WORD PTR [0EE2],1
MOV     ES,[BX+SI]
XLAT
CS:
IN      AL,DX
PUSH    CS
DB      C0
ADD     DL,AH
CS:
???     BYTE PTR [20CA]
ADC     BP,[SI]
POP     CS
AND     [BX+SI],AX
IMUL    WORD PTR [0F00]
XCHG    CX,AX
AND     DL,[BX+SI+4C]
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     [BX+DI+53],AL
PUSH    BX
INC     BP
PUSH    SP
PUSH    BX
AND     AL,[BX+SI]
ADD     CH,[BX]
OR      CL,[BX]
RETF    1520
SUB     AL,0F
SBB     AX,2A00
DAS
ADC     AL,0F
XCHG    CX,AX
AND     [BP+SI],AH
AND     AL,3A
AND     [DI+4F],CL
DEC     SI
INC     BP
PUSH    SP
INC     CX
PUSH    DX
POP     CX
AND     [BX+SI],AH
AND     BH,[BP+DI]
CALL    [BP+1328]
SUB     [BP+DI],DI
AND     BH,[BP+SI]
AND     [BX+45],DL
DEC     SP
INC     SI
INC     CX
PUSH    DX
INC     BP
AND     AL,[BX+SI]
XOR     AL,2F
PUSH    DS
POP     CS
RETF    1720
SUB     AL,12
ADD     [BX+2F],CL
SUB     [BX],CL
XCHG    CX,AX
AND     AL,[BX+4F]
PUSH    SI
INC     BP
PUSH    DX
DEC     SI
DEC     BP
INC     BP
DEC     SI
PUSH    SP
AND     [BX+46],CL
INC     SI
DEC     CX
INC     BX
DEC     CX
INC     CX
DEC     SP
AND     AL,[BX+SI]
POP     CX
DAS
XOR     CL,[BX]
RETF    1A20
SUB     AL,12
ADD     [DI+2F],CH
CMP     AL,0F
XCHG    CX,AX
AND     AL,[BP+DI+49]
PUSH    SP
POP     CX
AND     [BX+SI+4C],DL
INC     CX
DEC     SI
DEC     SI
INC     BP
PUSH    DX
AND     AL,[BX+SI]
JS      1E51
INC     SI
POP     CS
RETF    0F20
OR      AL,2C
ADC     AL,[BX+SI]
MOV     CS,[BX]
PUSH    AX
POP     CS
XCHG    CX,AX
AND     CL,[SI+41]
DEC     SI
INC     SP
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
INC     BP
PUSH    DX
AND     AL,[BX+SI]
CWD
DAS
POP     DX
POP     CS
RETF    0F20
POP     CS
SUB     AL,12
ADD     [BX+DI+642F],DH
POP     CS
XCHG    CX,AX
AND     AL,[DI+4E]
PUSH    SI
DEC     CX
PUSH    DX
DEC     DI
DEC     SI
DEC     BP
INC     BP
DEC     SI
PUSH    SP
INC     CX
DEC     SP
DEC     CX
PUSH    BX
PUSH    SP
AND     AL,[BX+SI]
MOV     SP,6E2F
POP     CS
RETF    0F20
ADC     CH,[SI]
ADC     AL,[BX+SI]
AAD     2F
JS      1E82
XCHG    CX,AX
AND     CL,[SI+41]
DEC     SI
INC     SP
AND     [BX+57],CL
DEC     SI
INC     BP
PUSH    DX
DAS
INC     SI
INC     CX
PUSH    DX
DEC     BP
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INC     BP
PUSH    DX
AND     AL,[BX+SI]
LOOPNZ  1EB9
OR      BYTE PTR [BX],CA
AND     [BX],DL
SUB     AL,0F
SUB     [BX+SI],AX
CLD
DAS
MOV     [BX],CS
XCHG    CX,AX
AND     DL,[BP+DI+4D]
INC     CX
DEC     SP
DEC     SP
AND     [BP+SI+55],AL
PUSH    BX
DEC     CX
DEC     SI
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+57],CL
DEC     SI
INC     BP
PUSH    DX
AND     AL,[BX+SI]
POP     ES
XOR     [BP+CA0F],DL
AND     [BP+SI],BL
SUB     AL,0F
SUB     [BX+SI],AX
ADC     AX,9F30
POP     CS
INC     SI
DEC     DI
PUSH    DX
DEC     BP
INC     CX
PUSH    SP
AND     [BX+DI+3A],AL
ADD     [BX+DI],CH
XOR     [BX+SI+910F],AH
AND     AL,[BP+SI+49]
INC     DI
AND     [BP+SI+55],AL
PUSH    BX
DEC     CX
DEC     SI
INC     BP
PUSH    BX
PUSH    BX
AND     AL,[BX+SI]
XOR     AX,AA30
POP     CS
RETF    0F20
OR      AL,2C
POP     CS
SUB     [BX+SI],AX
DEC     DI
XOR     [SI+910F],DH
AND     CL,[SI+4F]
PUSH    DI
AND     [BX+DI+4E],CL
INC     BX
DEC     DI
DEC     BP
INC     BP
AND     [BP+DI+49],AL
PUSH    SP
DEC     CX
POP     DX
INC     BP
DEC     SI
AND     [BX+SI],AL
POP     BX
XOR     [BP+CA0F],BH
AND     [BX],CL
POP     CS
SUB     AL,0F
SUB     [BX+SI],AX
JS      1F40
DB      C8
POP     CS
XCHG    CX,AX
AND     CL,[DI+49]
INC     SP
INC     SP
DEC     SP
INC     BP
AND     [BX+DI+4E],CL
INC     BX
DEC     DI
DEC     BP
INC     BP
AND     [BP+DI+49],AL
PUSH    SP
DEC     CX
POP     DX
INC     BP
DEC     SI
AND     AL,[BX+SI]
TEST    [BX+SI],DH
ROR     BYTE PTR [BX],CL
RETF    0F20
ADC     CH,[SI]
POP     CS
SUB     [BX+SI],AX
LAHF
XOR     AH,BL
POP     CS
XCHG    CX,AX
AND     CL,[BX+SI+49]
INC     DI
DEC     AX
AND     [BX+DI+4E],CL
INC     BX
DEC     DI
DEC     BP
INC     BP
AND     [BP+DI+49],AL
PUSH    SP
DEC     CX
POP     DX
INC     BP
DEC     SI
AND     AL,[BX+SI]
CMPSW
XOR     DH,AH
POP     CS
DEC     BP
OUT     11,AX
ADD     [BP+SI+F030],BH
POP     CS
AND     BYTE PTR [BX+SI],49
OUT     17,AX
AND     AH,CL
AND     [BX],CL
ADC     AH,[BX+SI]
IRET
AND     [SI],DL
ADD     AH,AL
XOR     CH,DH
POP     CS
DEC     BP
OUT     4D,AX
JMP     1F89
IRET
XOR     DL,BH
POP     CS
RETF    4920
SUB     AL,0F
ADC     AX,E200
XOR     [SI],AL
ADC     [BX+DI+2220],DL
AND     AL,22
CMP     CX,[DI+4F]
DEC     SI
INC     BP
POP     CX
SUB     [DI+29],CL
ADD     BH,CH
XOR     [CA10],CL
AND     [BX+DI-17],CL
ADC     CH,[SI]
POP     CS
ADC     AX,0300
XOR     [BX+SI],BX
ADC     [BP+SI+4B20],AL
OUT     12,AX
AND     AH,CL
AND     [BX+45],DL
DEC     SP
INC     SI
SUB     [DI+29],CL
ADD     [BX+SI],DL
XOR     [BP+SI],SP
ADC     [BX+DI+FF20],DL
XCHG    SI,AX
SUB     [BP+DI],DL
SUB     [BP+DI],DI
ADD     [BX+SI],BL
XOR     [SI],BP
ADC     [BP+DI+4B20],AL
ADD     [3631],BL
ADC     [BX+DI+2600],DL
XOR     [BX+SI+10],AX
AND     WORD PTR [BX+SI],+49
ADD     [BP+SI],BH
XOR     [BP+SI+10],CX
AND     BYTE PTR [BX+SI],49
OUT     20,AX
POP     SS
AND     AH,CL
AND     [BX],CL
ADC     AH,[BX+SI]
IRET
AND     [SI],DL
ADD     [SI+31],AL
PUSH    SP
ADC     [DI-19],CL
DEC     BP
JMP     2009
DEC     DI
XOR     [BP+10],BX
RETF    4920
SUB     AL,0F
DS:
ADD     [BX+DI+31],AH
DB      68
ADC     [BX+DI+2422],DL
AND     BH,[BP+DI]
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [DI+29],CL
ADD     [BP+31],CH
JB      2028
RETF    4920
JMP     4C30
POP     CS
DS:
ADD     [BP+SI+7C31],AL
ADC     [BP+SI+4B20],AL
OUT     12,AX
AND     AH,CL
AND     [BX+45],DL
DEC     SP
INC     SI
SUB     [DI+29],CL
ADD     [BX+8631],CL
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ADC     [BX+DI+FF20],DL
XCHG    SI,AX
SUB     [BP+DI],DL
SUB     [BP+DI],DI
ADD     [BX+8B31],DL
ADC     [BP+DI+4B20],AL
ADD     [DI+9031],BL
ADC     [BX+DI+A500],DL
XOR     [DI+8310],DX
AND     [BX+DI+00],CL
MOV     CL,31
CALL    0F20:CA10
SBB     [SI],CH
POP     CS
SBB     AX,[BX+SI]
AAM     31
MOVSB
ADC     [BX+DI+5022],DL
PUSH    DX
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [BP+4F],AL
PUSH    DX
AND     [BX+41],AL
DEC     BP
INC     BP
AND     [DI+45],CL
DEC     SI
PUSH    BP
AND     AL,[BX+SI]
FSAVE   [BX+DI]
SCASB
ADC     [BX+DI+24],AL
OUT     DE,AX
ADD     DH,CH
XOR     [BX+SI+8B10],DI
AND     [BX+DI+24],AL
OUT     22,AX
AND     CL,CH
AND     [10AE],CL
ADD     AH,DH
XOR     DX,AX
ADC     [BP+0800],CL
XOR     DL,DH
ADC     [BP+SI],BH
POP     CX
INC     DI
INC     CX
DEC     BP
INC     BP
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
PUSH    BX
ADD     [D832],CL
ADC     AL,AL
ADD     [BX+SI],BL
XOR     BL,BL
ADC     AL,CL
AND     [BX+DI],DL
SUB     AL,12
ADD     [BP+DI],AH
XOR     AH,AL
ADC     DL,CL
AND     [BP+DI],DL
SUB     AL,0F
AND     AL,[BX+SI]
AAA
XOR     CH,DL
ADC     [BX+DI+4722],DL
INC     CX
DEC     BP
INC     BP
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
PUSH    BX
AND     AL,[BX+SI]
INC     CX
XOR     DH,AH
ADC     DL,CL
AND     [DI],DL
SUB     AL,12
ADD     [BP+DI+32],AH
OR      [BX+DI],DL
XCHG    CX,AX
AND     DH,[BX+DI]
CS:
AND     [BP+DI+69],DL
DB      6E
DB      67
DB      6C
DB      65
AND     [BP+61],AL
DB      6D
DB      69
DB      6C
JNS     212B
INC     SP
JA      2173
DB      6C
DB      6C
DB      69
DB      6E
DB      67
JNB     2137
ADD     [BX+1232],AL
ADC     [BX+DI+3222],DX
CS:
AND     [DI+75],CL
DB      6C
JZ      218D
JO      2192
DB      65
AND     [BP+61],AL
DB      6D
DB      69
DB      6C
JNS     214F
INC     SP
JA      2197
DB      6C
DB      6C
DB      69
DB      6E
DB      67
JNB     215B
ADD     AH,BL
XOR     AH,[9111]
AND     DH,[BP+DI]
CS:
AND     [BP+DI+6D],DL
DB      61
DB      6C
DB      6C
AND     [BP+SI+65],DL
JZ      21AE
DB      69
DB      6C
AND     [5020],AH
JB      21C4
DB      66
DB      65
JNB     21CC
DB      69
DB      6F
DB      6E
DB      61
DB      6C
AND     [BX+SI],CH
DB      6F
DB      66
DB      66
DB      69
DB      63
DB      65
CMP     SP,[BX+SI]
DB      62
DB      61
DB      6E
DB      6B
CMP     SP,[BX+SI]
JB      21D5
JNB     21E6
DB      61
JNZ     21E7
DB      61
DB      6E
JZ      21B4
AND     [BP+65],CH
DB      69
DB      67
DB      68
DB      62
DB      6F
JB      21EB
DB      6F
DB      6F
DB      64
AND     [BX+SI+6C],DH
DB      61
JPE     21ED
SUB     [BP+SI],SP
ADD     [BP+DI],AH
XOR     SI,[BX+SI]
ADC     [BX+DI+3422],DX
CS:
AND     [SI+61],CL
JB      2203
DB      65
AND     [BP+SI+65],DL
JZ      2203
DB      69
DB      6C
AND     [BX+SI],CH
JNB     2210
DB      6F
JO      221B
DB      69
DB      6E
DB      67
AND     [DI+61],CH
DB      6C
DB      6C
CMP     SP,[BX+SI]
DB      67
DB      6F
JBE     221E
JB      2229
DB      6D
DB      65
DB      6E
JZ      21E0
DB      6F
DB      66
DB      66
DB      69
DB      63
DB      65
JNB     2203
AND     [DI+6E],DH
DB      69
JBE     2233
JB      2243
DB      69
```

```
JZ      224C
SUB     [BP+SI],SP
ADD     [SI+33],AL
CMP     DL,[BX+DI]
XCHG    CX,AX
AND     DH,[DI]
CS:
AND     [DI+61],CL
DB      6E
JNZ     224A
DB      61
DB      63
JZ      225D
JB      2253
DB      6E
DB      67
AND     [BX+DI+6E],CL
DB      64
JNZ     2265
JZ      2266
JNS     2218
ADD     [BX+33],DL
INC     SP
ADC     [BX+DI+3622],DX
CS:
AND     [BX+SI+61],DL
JB      226F
DB      6C
DB      61
DB      6E
DB      64
AND     AL,[BX+SI]
NOP
XOR     CX,[BP+11]
XCHG    CX,AX
AND     DH,[BX]
CS:
AND     [SI+72],DL
DB      61
DB      6E
JNB     2289
DB      6F
JB      2290
DB      61
JZ      2288
DB      6F
DB      6E
AND     [BP+65],CL
JZ      229D
DB      6F
JB      2294
AND     [BX+SI],CH
DB      61
DB      69
JB      229F
DB      6F
JB      22A6
CMP     SP,[BX+SI]
JB      2297
DB      69
DB      6C
AND     [BP+DI+74],DH
DB      61
JZ      22A7
DB      6F
DB      6E
SUB     [BP+SI],SP
ADD     [BP+DI+5833],BL
ADC     DX,CX
AND     [BX],CL
ADC     [SI],CH
ADC     AL,[BX+SI]
JMP     9111:6233
AND     DL,[BP+DI+74]
DB      6F
JO      2279
DB      6E
DB      6F
JA      227D
DB      61
DB      6E
DB      64
AND     [SI+69],AH
JNB     22C8
JNZ     22DA
JNB     2289
DB      6F
DB      6E
DB      65
AND     [BX+66],CH
AND     [SI+68],DH
DB      65
JNB     22DA
AND     [BP+DI+68],AH
DB      6F
DB      69
DB      63
DB      65
JNB     22AC
AND     [BX+6F],AL
JBE     22E8
JB      22F3
DB      6D
DB      65
DB      6E
JZ      22AA
DB      6F
DB      66
DB      66
DB      69
DB      63
DB      69
DB      61
DB      6C
AND     [DI+61],CH
JNS     22B7
JNB     230D
DB      6F
JO      22BE
ADD     [SI],DH
XOR     AL,67
ADC     [BX+DI+6422],DX
DB      69
JNB     230A
JNZ     231C
JNB     2314
DB      6F
DB      6E
AND     [BX+DI+74],AH
AND     [BX+DI+6E],AH
JNS     22D5
JZ      2320
DB      6D
DB      65
AND     [BX+DI+6E],AH
DB      64
AND     [BP+DI+61],AH
DB      6C
DB      6C
AND     [BP+6F],AH
JB      22E7
DB      61
AND     [BP+6F],DH
JZ      2332
CS:
AND     [SI+6F],DL
AND     [BP+6F],DH
JZ      233B
SUB     AL,20
JB      233F
JZ      2351
JB      234C
AND     [SI+6F],DH
AND     [SI+68],DH
DB      65
AND     AL,[BX+SI]
PUSH    SP
XOR     AL,69
ADC     [BX+DI+6722],DX
DB      61
DB      6D
DB      65
AND     [DI+65],CH
DB      6E
JNZ     2317
DB      61
DB      6E
DB      64
AND     [BP+DI+68],AH
DB      6F
DB      6F
JNB     2366
AND     [BP+DI],AH
XOR     AX,222E
ADD     [DI+34],BL
DB      6C
ADC     [BX+DI+913A],DX
CMP     AL,[BX+SI]
JG      2346
JBE     2325
XCHG    CX,AX
AND     DH,CL
POP     CS
PUSH    DS
SUB     [BP+DI],DI
AND     DL,[BP+DI+54]
DEC     DI
PUSH    AX
AND     [BP+4F],CL
PUSH    DI
AND     [BX+DI+4E],AL
INC     SP
AND     [SI+49],AL
PUSH    BX
INC     BX
PUSH    BP
PUSH    BX
PUSH    BX
AND     AL,[BX+SI]
MOV     DH,[SI]
ADC     BYTE PTR [BX+DI],CA
AND     [BX],CL
SBB     [SI],CH
ADC     AL,[BX+SI]
LODSW
XOR     AL,8A
ADC     [BX+DI+5022],DX
JB      23AB
JNB     23BB
AND     [BX+DI+6E],AH
JNS     236D
DB      6B
DB      65
JNS     2371
DB      66
DB      6F
JB      2375
DB      67
DB      61
DB      6D
DB      65
AND     [DI+65],CH
DB      6E
JNZ     2381
ADD     [BP+9434],DH
ADC     [BX+DI+24],AX
OUT     DE,AX
ADD     BH,AL
XOR     AL,9E
ADC     [BP+DI+4120],CX
AND     AL,E7
AND     AH,[BP+SI]
INT     20
PUSH    CS
```

```
XCHG    SP,AX
ADC     [BX+SI],AX
INT     34
TEST    AL,11
MOV     ES,[BX+SI]
CALL    25B7
ADC     BH,[BP+SI]
POP     CX
AND     [BX+54],CL
DEC     AX
INC     BP
PUSH    DX
AND     [BX+50],CL
PUSH    SP
DEC     CX
DEC     DI
DEC     SI
PUSH    BX
AND     [SI+49],CL
PUSH    BX
PUSH    SP
ADD     DH,CH
XOR     AL,0C
ADC     AL,AL
ADD     [BP+SI+35],AL
PUSH    SS
ADC     BH,[BP+SI]
POP     CX
INC     BX
DEC     AX
INC     BP
INC     BX
DEC     BX
AND     [BX+41],AL
DEC     BP
INC     BP
AND     [BP+DI+4F],AL
PUSH    BP
DEC     SI
PUSH    SP
INC     BP
PUSH    DX
AND     [BX+DI+53],CL
AND     [BX+DI+54],AL
AND     [SI+45],CL
INC     CX
PUSH    BX
PUSH    SP
AND     [BP+DI],DH
AND     [BX+DI+4E],AL
INC     SP
AND     [BX+DI+46],CL
AND     [BP+4F],CL
PUSH    SP
AND     [BP+SI+45],DL
PUSH    SP
PUSH    BP
PUSH    DX
DEC     SI
AND     [SI+4F],DL
AND     [BX+41],AL
DEC     BP
INC     BP
AND     [BX+SI+52],DL
INC     BP
PUSH    BX
INC     BP
DEC     SI
PUSH    SP
INC     CX
PUSH    SP
DEC     CX
DEC     DI
DEC     SI
AND     [DI+45],CL
DEC     SI
PUSH    BP
ADD     [DI+35],CL
AND     [BP+SI],DL
RETF    0F20
OR      AL,2C
ADC     AL,[BX+SI]
MOV     DL,35
SUB     DL,[BP+SI]
MOV     SP,[BX+SI]
INC     DI
PUSH    AX
AND     AL,CH
AND     [SI],DL
AND     CH,CL
AND     [BX+DI+2220],DL
PUSH    BX
DEC     DI
PUSH    DX
PUSH    DX
POP     CX
SUB     AL,20
POP     CX
DEC     DI
PUSH    BP
AND     [DI+41],CL
POP     CX
AND     [BP+4F],CL
PUSH    SP
AND     [BP+DI+45],DL
INC     BP
AND     [SI+48],DL
DEC     CX
PUSH    BX
AND     [BP+DI+45],DL
PUSH    SP
AND     [BX+46],CL
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
PUSH    BX
AND     [DI+4E],DL
PUSH    SP
DEC     CX
DEC     SP
AND     [BP+DI],DH
AND     [BP+SI+4F],DL
PUSH    BP
DEC     SI
INC     SP
PUSH    BX
AND     [BX+SI+41],CL
PUSH    SI
INC     BP
AND     [BP+SI+45],AL
INC     BP
DEC     SI
AND     [BX+SI+4C],DL
INC     CX
POP     CX
INC     BP
INC     SP
AND     BH,[BP+SI]
AND     [BX+DI+0E20],CL
POP     BX
ADC     AX,[BX+SI]
MOV     SP,2F35
ADC     CL,DL
AND     [BP+SI],DL
SUB     AL,12
ADD     DH,AH
XOR     AX,1234
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     BP,[BX+DI]
CMP     SP,[BX+SI]
AND     AL,[BX+DI+44]
INC     SP
DEC     CX
PUSH    SP
DEC     CX
DEC     DI
DEC     SI
INC     CX
DEC     SP
AND     [BX+SI+4C],DL
INC     CX
DEC     SI
DEC     SI
DEC     CX
DEC     SI
INC     DI
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
PUSH    BX
AND     AL,[BX+SI]
IN      AL,DX
XOR     AX,123E
XCHG    CX,AX
ADD     [BX+SI],AH
SS:
DEC     AX
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
XOR     [5420],BP
DEC     CX
INC     BP
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
DEC     BP
INC     BP
DEC     SI
PUSH    SP
AND     [SI+4F],DL
AND     [SI+48],DL
INC     BP
AND     [BP+41],DL
INC     BX
INC     CX
DEC     SI
INC     BX
POP     CX
AND     [BP+SI+41],DL
PUSH    SP
INC     BP
AND     AL,[BX+SI]
DB      66
SS:
PUSH    DX
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [BX+DI+66],CL
AND     [SI+68],DH
DB      65
AND     [BP+61],DH
DB      63
DB      61
DB      6E
DB      63
JNS     2511
JB      2554
JZ      255A
AND     [BX+65],AH
JZ      256D
```

```
AND     [SI+6F],DH
DB      6F
AND     [BX+SI+69],CH
DB      67
DB      68
SUB     AL,20
DB      65
JBE     256D
JB      2583
DB      6F
DB      6E
DB      65
DAA
JNB     2530
JA      2577
DB      6C
DB      66
DB      61
JB      257C
AND     AL,[BX+SI]
SCASW
SS:
POP     SP
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [SI+65],AH
DB      63
JB      2592
DB      61
JNB     2595
JNB     2560
AND     [BX+DI+6F],BL
JNZ     2557
DB      63
DB      61
DB      6E
AND     [BX+SI+72],DH
DB      65
JBE     25A5
DB      6E
JZ      2563
JZ      25AD
DB      69
JNB     2568
DB      62
JNS     256B
JZ      25C6
DB      69
DB      6E
DB      67
AND     [SI+65],AH
JBE     25BA
DB      6C
DB      6F
JO      25C6
DB      65
DB      6E
JZ      257D
JZ      25CE
AND     [BP+SI],AH
ADD     AL,BH
SS:
DB      66
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [SI+68],DH
DB      65
AND     [BP+61],DH
DB      63
DB      61
DB      6E
DB      63
JNS     259D
JB      25E0
JZ      25E6
CS:
AND     [SI+68],DL
DB      69
JNB     25A8
DB      6D
DB      65
DB      61
DB      6E
JNB     25AE
DB      6E
DB      6F
AND     [DI+6E],DH
DB      6F
DB      63
DB      63
JNZ     2608
DB      69
DB      65
DB      64
AND     [BX+SI],CH
DB      62
DB      6C
DB      61
DB      63
DB      6B
SUB     [BX+SI],SP
DB      61
JB      260C
DB      61
JNB     25CC
ADD     [BX+SI+37],AL
JO      25C1
XCHG    CX,AX
AND     DH,CL
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [BP+DI+61],AH
DB      6E
AND     [BP+SI+65],AH
AND     [SI+65],AH
JBE     262A
DB      6C
DB      6F
JO      262E
DB      64
AND     [DI+6E],DH
JZ      2638
DB      6C
AND     [SI+68],DH
DB      65
AND     [BP+61],DH
DB      63
DB      61
DB      6E
DB      63
JNS     25FD
JB      2640
JZ      2646
AND     [BP+61],AH
DB      6C
DB      6C
JNB     2608
DB      62
DB      65
DB      6E
DB      65
DB      61
JZ      2657
AND     [BX+DI+22],AH
ADD     [SI+7A37],AL
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [BP+DI+65],AH
JB      267A
DB      61
DB      69
DB      6E
AND     [BX+SI+65],DH
JB      262E
DB      63
DB      65
DB      6E
JZ      2641
AND     [BX+SI+6F],CL
JA      267D
JBE     267F
JB      2648
AND     [BX],AH
DB      69
DB      6E
DB      66
DB      69
DB      6C
DB      6C
DB      69
DB      6E
DB      67
DAA
AND     [BX+66],CH
AND     [BX+SI+61],DH
JB      26A4
DB      69
DB      61
DB      6C
DB      6C
JNS     2658
ADD     AH,CL
AAA
TEST    [BP+SI],DL
XCHG    CX,AX
AND     DH,CL
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [SI+65],AH
JBE     26AF
DB      6C
DB      6F
JO      26B3
DB      64
AND     [BX+DI+72],AH
DB      65
DB      61
JNB     2676
SUB     [BX+DI+6E],AH
JNS     267B
DB      63
DB      6F
DB      6C
DB      6F
JB      26C6
DB      64
AND     [BX+DI+72],AH
DB      65
DB      61
SUB     [BX+SI],SP
DB      69
JNB     268C
DB      61
DB      6C
DB      6C
DB      6F
JA      26D7
DB      64
AND     [BX+DI+6E],AH
DB      64
AND     [BX+SI+65],CH
```

```
DB      6C
JO      26F0
AND     AL,[BX+SI]
DIV     WORD PTR [BX]
MOV     SS,[BP+SI]
XCHG    CX,AX
AND     DH,CL
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [SI+6F],DH
AND     [SI+6F],CH
JA      26FA
JB      26B7
JZ      2701
DB      65
AND     [BP+61],DH
DB      63
DB      61
DB      6E
DB      63
JNS     26C3
JB      2706
JZ      270C
CS:
AND     AL,[BX+SI]
STD
AAA
CBW
ADC     DL,[BX+DI+2E00]
CMP     [BP+SI+9112],AH
AND     DH,CL
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
XOR     CH,[4920]
DEC     BP
PUSH    AX
DEC     DI
PUSH    BX
INC     BP
AND     [BX+DI+4D],CL
PUSH    AX
INC     CX
INC     BX
PUSH    SP
AND     [BP+45],AL
INC     BP
PUSH    BX
AND     [BX+4E],CL
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
INC     BP
PUSH    DX
PUSH    BX
AND     AL,[BX+SI]
JA      271B
LODSB
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [SI+65],AL
JBE     2759
DB      6C
DB      6F
JO      275D
JB      276D
AND     [BX+65],AH
JZ      271F
JZ      2769
DB      65
AND     [BX+SI+72],DH
DB      6F
DB      66
DB      69
JZ      277D
AND     [BX+DI+6E],CH
AND     [DI+6F],CH
JNB     2786
AND     [SI+79],DH
JO      277C
JNB     2739
DB      6F
DB      66
AND     [SI+65],AH
JBE     2785
DB      6C
DB      6F
JO      2791
DB      65
DB      6E
JZ      2756
AND     AL,[BX+SI]
MOV     BP,B638
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [BX+SI+6F],CL
JA      27A2
JBE     27A4
JB      276D
AND     [BX+DI+6C],AH
DB      6C
AND     [BP+DI+69],AH
JZ      27B3
JPE     27B1
DB      6E
JNB     276F
DB      62
DB      65
DB      61
JB      2774
JZ      27BE
DB      65
AND     [BP+DI+6F],AH
JNB     27D0
JNB     277E
DB      6F
DB      66
AND     [BX+SI+72],DH
DB      6F
JBE     27CF
DB      64
DB      69
DB      6E
DB      67
AND     [SI+68],DH
DB      65
AND     AL,[BX+SI]
POP     ES
CMP     AX,AX
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [BX+DI+6E],CH
DB      66
JB      27E5
JNB     27FA
JB      27FD
DB      63
JZ      2800
JB      27F2
AND     [BX+SI],CH
JNB     27F6
JA      27F8
JB      2808
SUB     AL,20
JNZ     280D
DB      69
DB      6C
DB      69
JZ      2817
AND     [SI+69],CH
DB      6E
DB      65
JNB     27D1
AND     [BP+SI+6F],DH
DB      61
DB      64
JNB     27D8
AND     [BX+61],DH
JZ      2816
JB      27D3
DB      65
JZ      2819
CS:
SUB     [BP+SI],SP
ADD     [BX+DI+39],DL
RETF    9112
AND     DH,CL
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [SI+6F],DH
AND     [SI+68],DH
DB      65
AND     [BP+65],CH
JA      27F4
DB      64
DB      65
JBE     283D
DB      6C
DB      6F
JO      2849
DB      65
DB      6E
JZ      280E
AND     [BP+SI+79],AL
AND     [BX+DI+6D],CH
JO      2857
JNB     2853
DB      6E
DB      67
AND     [BX+DI+6D],CH
JO      2852
DB      63
JZ      2814
DB      66
DB      65
DB      65
JNB     2819
JZ      2863
DB      65
AND     [BP+DI+6F],AH
JNB     2875
JNB     2825
ADD     [DI+D439],DL
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [BX+66],CH
AND     [SI+68],DH
DB      69
JNB     283B
DB      69
DB      6E
DB      66
JB      2881
JNB     2896
JB      2899
```

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DB      63
JZ      289C
JB      288E
AND     [BX+DI+73],CH
AND     [BP+SI+6F],AH
JB      289F
DB      65
AND     [BP+SI+79],AH
AND     [SI+68],DH
DB      6F
JNB     28A0
AND     [DI+61],CH
DB      6B
DB      69
DB      6E
DB      67
AND     [SI+68],DH
DB      65
AND     AL,[BX+SI]
RET
CMP     SI,BX
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
AND     [BX+SI],AH
AND     [SI+68],DH
DB      65
AND     [BX+SI+72],DH
DB      6F
DB      66
DB      69
JZ      28D5
AND     [DI],CH
AND     [SI+68],DH
DB      65
AND     [SI+65],AH
JBE     28D2
DB      6C
DB      6F
JO      28D6
JB      28E6
CS:
AND     AL,[BX+SI]
DB      C9
CMP     AX,BP
ADC     DL,[BX+DI+1400]
CMP     DH,DL
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
XOR     BP,[4320]
DEC     AX
INC     CX
PUSH    DX
INC     DI
INC     BP
AND     [BX+DI+20],AL
INC     SI
INC     BP
INC     BP
AND     [BP+4F],AL
PUSH    DX
AND     [BX+DI+4E],AL
POP     CX
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
DEC     BP
INC     BP
DEC     SI
PUSH    SP
AND     [SI+4F],DL
AND     [BP+SI+45],AL
AND     [BP+DI+45],DL
PUSH    SP
AND     [BX+DI+53],AL
DEC     CX
INC     SP
INC     BP
AND     [BP+4F],AL
PUSH    DX
AND     [BX+SI+41],DL
PUSH    DX
DEC     BX
PUSH    BX
AND     AL,[BX+SI]
SBB     BH,[BP+SI]
HLT
ADC     DL,[BX+DI+3E00]
CMP     DH,BH
ADC     DL,[BX+DI+CE20]
POP     CS
OR      CH,[BX+DI]
CMP     SP,[BP+SI]
XOR     [5220],CH
INC     BP
PUSH    SP
PUSH    BP
PUSH    DX
DEC     SI
AND     [SI+4F],DL
AND     [BX+41],AL
DEC     BP
INC     BP
AND     [DI+45],CL
DEC     SI
PUSH    BP
AND     AL,[BX+SI]
INC     SP
CMP     BH,CL
ADC     DL,[BX+DI+6B00]
CMP     BH,AH
ADC     DL,[BX+DI+4322]
DEC     AX
DEC     DI
DEC     DI
PUSH    BX
INC     BP
AND     [BP+SI+59],AL
AND     [BP+55],CL
DEC     BP
INC     DX
INC     BP
PUSH    DX
AND     [BX+SI],DH
SUB     AL,20
XOR     [SI],BP
AND     [BP+SI],DH
SUB     AL,20
DEC     DI
PUSH    DX
AND     [BP+DI],DH
AND     BH,[BP+DI]
ADD     [BX+3A],DH
PUSH    ES
ADC     AX,[DI+4120]
INC     SP
INC     SP
INC     BX
DEC     AX
ADD     [BP+DI+103A],CL
ADC     AX,[BX+DI+44]
INC     SP
INC     BX
DEC     AX
OUT     FF,AX
TEST    [BX+SI],BP
INC     CX
INC     SP
INC     SP
INC     BX
DEC     AX
SUB     [BX+SI],AX
SCASB
CMP     BL,[BP+SI]
ADC     CX,[BP+DI+4120]
INC     SP
INC     SP
INC     BX
DEC     AX
AND     AL,CH
AND     [BX+DI],DL
AND     BH,CH
AND     [BX+DI+44],AL
INC     SP
INC     BX
DEC     AX
AND     DH,AH
ADC     AL,20
INT     20
MOV     [BX+SI],SP
PUSH    CS
ADD     DL,[BP+SI]
ADD     DH,AL
CMP     AH,[SI]
ADC     CX,[BP+DI+4120]
INC     SP
INC     SP
INC     BX
DEC     AX
AND     BH,AH
AND     [BX+DI],DL
AND     CH,CL
AND     [BX+DI+0E20],CL
MOV     [BP+DI],DL
ADD     AL,DL
CMP     CH,[8D13]
AND     [1522],CL
ADD     CH,AH
CMP     BH,[BX+SI]
ADC     CX,[BP+DI+5320]
PUSH    DI
AND     BH,AH
AND     [BX+DI],DL
AND     CH,CL
AND     [BX+DI+0E20],CL
MOV     [BP+DI],DL
ADD     BH,BH
CMP     AL,[BP+SI+13]
MOV     SP,[BX+SI]
INC     CX
INC     SP
INC     SP
INC     BX
DEC     AX
AND     BH,AH
AND     [BP+SI],DL
AND     CH,CL
AND     [SI+49],DL
INC     BP
AND     BH,AH
AND     [BP+SI],DL
ADD     [BP+DI],BL
CMP     CX,[SI+13]
MOV     SP,[BX+SI]
INC     CX
INC     SP
INC     SP
INC     BX
DEC     AX
AND     BH,AH
AND     [BP+DI],DL
AND     CH,CL
AND     [BX+DI+4D],CL
PUSH    AX
INC     BX
PUSH    SP
AND     BH,AH
AND     [BP+SI],DL
```

```
ADD     [563B],DH
ADC     CX,[BP+DI+4120]
INC     SP
INC     SP
INC     BX
DEC     AX
AND     BH,AH
AND     [SI],DL
AND     CH,CL
AND     [BX+SI+41],DL
PUSH    DX
DEC     BX
AND     BH,AH
AND     [BP+SI],DL
ADD     [BP+SI+3B],AL
POP     AX
ADC     CX,DX
AND     [BX],CL
ADC     AX,0F2C
SBB     AX,[BX+SI]
DB      63
CMP     BX,[BP+DI+13]
XCHG    CX,AX
AND     DL,[BX+SI+52]
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [SI+4F],DL
AND     [BP+DI+4F],AL
DEC     SI
PUSH    SP
DEC     CX
DEC     SI
PUSH    BP
INC     BP
AND     AL,[BX+SI]
DB      6C
CMP     SP,[BX+SI+13]
INC     CX
AND     AL,E7
FIADD   WORD PTR [BX+SI]
JLE     2A5C
DB      65
ADC     CX,[BP+DI+4120]
AND     AL,E7
AND     AH,[BP+SI]
AND     CH,CL
AND     [1360],CL
ADD     [SI+873B],AL
ADC     DX,[SI+8A00]
CMP     CX,[BX+SI+8E13]
ADD     [BX+923B],BL
ADC     DI,[BP+SI]
POP     CX
DEC     BP
INC     CX
DEC     BX
INC     BP
AND     [BX+DI+20],AL
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
ADD     [BX+DI+A63B],CH
ADC     CX,[DI+0E20]
AND     DL,[DI]
ADD     [BX+AB3B],CH
ADC     AX,AX
ADD     DL,AL
CMP     SI,[BX+SI+8B13]
AND     [BP+DI+57],DL
OUT     11,AX
AND     CH,CL
AND     [BX+DI+0E20],CL
SUB     [SI],DL
ADD     CH,BH
CMP     DI,[BP+SI+9113]
AND     [BP+SI],AH
DEC     CX
DEC     SI
INC     SP
DEC     CX
INC     BX
INC     CX
PUSH    SP
INC     BP
AND     [BX+DI+4F],BL
PUSH    BP
PUSH    DX
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     [BP+SI+59],AL
AND     [BP+55],CL
DEC     BP
INC     DX
INC     BP
PUSH    DX
CS:
AND     [BP+DI+45],DL
INC     BP
AND     [BX+DI+4F],BL
PUSH    BP
PUSH    DX
AND     [BX+SI+41],CL
DEC     SI
INC     SP
AND     [SI+49],CL
PUSH    BX
PUSH    SP
AND     AL,[BX+SI]
OR      DI,[SI]
LES     DX,[BP+DI]
TEST    [BX+SI],SP
INC     SP
INC     BP
PUSH    SI
INC     BP
DEC     SP
INC     BX
DEC     AX
ADD     [BX+DI],DH
CMP     AL,C9
ADC     CX,[BP+DI+4420]
INC     BP
PUSH    SI
INC     BP
DEC     SP
INC     BX
DEC     AX
AND     DH,AH
SBB     [BX+SI],AH
OUT     DX,AX
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
INC     BX
DEC     AX
AND     AL,CH
ADC     AH,[BX+SI]
INT     20
MOV     [BX+SI],SP
PUSH    CS
MOV     DX,0013
JNB     2B22
INTO
ADC     DX,[BX+DI+4922]
DEC     SI
INC     SP
DEC     CX
INC     BX
INC     CX
PUSH    SP
INC     BP
AND     [BP+DI+45],DL
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     [BX+46],CL
AND     [BP+DI+49],AL
PUSH    SP
POP     CX
AND     [SI+4F],DL
AND     [BP+SI+45],AL
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
INC     BP
INC     SP
AND     [BP+SI+59],AL
AND     [SI+45],CL
PUSH    SP
PUSH    SP
INC     BP
PUSH    DX
AND     [4E20],AH
PUSH    BP
DEC     BP
INC     DX
INC     BP
PUSH    DX
AND     AL,[BX+SI]
CMP     WORD PTR [SI],13D8
TEST    [BX+SI],SP
PUSH    BX
INC     BP
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     AL,00
IN      AX,3C
LOOP    2B4B
MOV     SP,[BX+SI]
CALL    [BP+SI+5328]
INC     BP
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     AL,29
CALL    402E
AND     CH,CL
AND     [BX+DI+2220],DL
PUSH    SP
POP     CX
PUSH    AX
INC     BP
AND     [BX+DI+4E],CL
AND     [BP+DI+45],DL
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     [BX+DI+47],AL
INC     CX
DEC     CX
DEC     SI
CS:
AND     [BP+SI+45],DL
DEC     BP
```

```
INC     BP
DEC     BP
INC     DX
INC     BP
PUSH    DX
AND     [SI+59],DL
PUSH    AX
INC     BP
AND     [BX+DI+20],AL
DEC     SP
INC     BP
PUSH    SP
PUSH    SP
INC     BP
PUSH    DX
AND     [BP+4F],AL
DEC     SP
DEC     SP
DEC     DI
PUSH    DI
INC     BP
INC     SP
AND     [BP+SI+59],AL
AND     [BP+SI],DH
AND     [BP+55],CL
DEC     BP
INC     DX
INC     BP
PUSH    DX
PUSH    BX
AND     BH,[BP+SI]
MOV     [BX+SI],SP
PUSH    CS
INTO
ADC     AX,[BX+SI]
???     [SI]
IN      AL,DX
ADC     AX,[BP+DI+4F]
DEC     SP
OUT     FF,AX
XCHG    BP,AX
SUB     BH,BH
SUB     WORD PTR [BX+SI],4553
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     AL,2C
ADC     CH,[BX+DI]
SUB     [BX+SI],AX
SBB     [DI],DI
NOT     BYTE PTR [BP+DI]
MOV     SP,[BX+SI]
INC     BX
DEC     DI
DEC     SP
OUT     0F,AL
DEC     SI
AND     CH,CL
AND     [BP+DI+4F],AL
DEC     SP
OUT     43,AX
DEC     DI
DEC     SP
JMP     8200:200F
CMP     AX,1400
MOV     SP,[BX+SI]
INC     BX
DEC     DI
DEC     SP
CALL    6CE7
AND     BH,CH
AND     [BP+DI+4F],AL
DEC     SP
OUT     0F,AL
DEC     SI
AND     CH,CL
AND     [BX+DI+5722],DL
PUSH    DX
DEC     DI
DEC     SI
INC     DI
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
CS:
AND     [SI+52],DL
POP     CX
AND     [BX+DI+47],AL
INC     CX
DEC     CX
DEC     SI
CS:
AND     [BP+SI+45],DL
DEC     BP
INC     BP
DEC     BP
INC     DX
INC     BP
PUSH    DX
AND     [SI+45],CL
PUSH    SP
PUSH    SP
INC     BP
PUSH    DX
AND     [BX+46],CL
AND     [BP+DI+49],AL
PUSH    SP
POP     CX
AND     [BP+DI+45],DL
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     [DI+55],CL
PUSH    BX
PUSH    SP
AND     [BP+DI+4F],AL
DEC     BP
INC     BP
AND     [BP+49],AL
PUSH    DX
PUSH    BX
PUSH    SP
AND     BH,[BP+SI]
MOV     [BX+SI],SP
PUSH    CS
INTO
ADC     AX,[BX+SI]
SAHF
CMP     AX,140A
PUSH    DX
DEC     DI
PUSH    DI
OUT     FF,AX
XCHG    SP,AX
SUB     BH,BH
SUB     WORD PTR [BX+SI],+53
INC     BP
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     AL,2C
ADC     BP,[SI]
ADC     BP,[BX+DI]
SUB     [BX+SI],AX
CLI
CMP     AX,1414
MOV     SP,[BX+SI]
PUSH    DX
DEC     DI
PUSH    DI
AND     AL,CH
AND     [BP+SI],DL
AND     BH,CH
AND     [BP+SI+4F],DL
PUSH    DI
AND     DH,AH
AND     [BX],CL
OR      SP,[BX+SI]
INT     20
XCHG    CX,AX
AND     [BP+SI],AH
PUSH    DI
PUSH    DX
DEC     DI
DEC     SI
INC     DI
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
CS:
AND     [SI+52],DL
POP     CX
AND     [BX+DI+47],AL
INC     CX
DEC     CX
DEC     SI
CS:
AND     [BP+DI+48],AL
DEC     DI
DEC     DI
PUSH    BX
INC     BP
AND     [BX+DI+20],AL
PUSH    DX
DEC     DI
PUSH    DI
AND     [BP+SI+45],AL
PUSH    SP
PUSH    DI
INC     BP
INC     BP
DEC     SI
AND     [BX+DI],DH
AND     [BX+DI+4E],AL
INC     SP
AND     [BX+DI],DH
XOR     [BP+SI],SP
CMP     CL,[BX+DI+0E20]
INTO
ADC     AX,[BX+SI]
ES:
DS:
PUSH    DS
ADC     AL,95
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
INC     BX
DEC     AX
AND     [DI+0E20],CL
PUSH    DS
PUSH    DS
SUB     AL,0E
DEC     DX
POP     DS
SUB     AL,0E
JBE     2CE8
SUB     AL,0E
DS:
AND     [SI],BP
PUSH    CS
SUB     BL,[SI]
SUB     AL,0E
INC     DX
AND     CH,[SI]
PUSH    CS
```

```
MUL     BYTE PTR [BP+SI]
ADD     [BP+3E],AL
SUB     [SI],DL
MOV     SP,[BX+SI]
INC     DI
PUSH    AX
OUT     11,AL
AND     DH,CH
AND     [BX+50],AL
AND     BL,DH
AND     [SI],DL
AND     BH,AH
AND     [BX+DI],DL
AND     CH,CL
AND     [DI+0E20],CL
ADC     BYTE PTR [4C00],3E
XOR     DL,[SI]
MOV     ES,[BX+SI]
PUSH    DX
DS:
AND     DL,[DI]
DB      C0
ADD     [BP+3E],BL
DAA
ADC     AX,5047
OUT     47,AX
PUSH    AX
JMP     2D23
JA      2D51
SUB     AL,15
PUSH    SP
INC     SI
DEC     DI
PUSH    DX
OUT     11,AX
CMP     DL,[SI+41]
INC     DI
DEC     SI
PUSH    BX
PUSH    SP
OUT     11,AX
CMP     DL,[BP+DI+57]
OUT     11,AX
ADD     [DI+3E],BH
CS:
ADC     AX,00C0
MOV     [1531],DI
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     CH,[BX+DI]
CMP     AX,[BX+SI]
CALL    8215:363E
AND     [BX+DI+20],CL
OUT     20,AX
ADC     AH,[BX+SI]
INT     3
AND     [BX],CL
PUSH    DS
ADD     [DI+403E],AH
ADC     AX,2091
AND     CH,[BP+SI]
AND     BH,[BP+DI]
ADD     [DI+433E],CH
ADC     AX,2083
DEC     CX
ADD     [BP+DI+453E],DH
ADC     AX,0091
RETF
DS:
DEC     DX
ADC     AX,2091
INTO
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
CMP     CX,SI
POP     CS
AAA
SUB     [BP+DI],DI
AND     CH,[BP+SI]
AND     AL,[BX+SI]
DB      F1
DS:
PUSH    SP
ADC     AX,2091
INTO
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
CMP     CX,SI
POP     CS
AND     AX,3B29
AND     DL,[BP+4F]
PUSH    SP
DEC     CX
DEC     SI
INC     DI
AND     BH,[BP+DI]
INTO
POP     CS
AAA
SUB     [BP+DI],DI
AND     CH,[BP+SI]
AND     AL,[BX+SI]
SBB     AX,5E3F
ADC     AX,2091
INTO
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BX+SI]
AND     [BX+SI],AH
INC     BP
DEC     SI
PUSH    SP
INC     BP
PUSH    DX
AND     [BX+DI+4F],BL
PUSH    BP
PUSH    DX
AND     [BP+4F],DL
PUSH    SP
INC     BP
AND     [BP+4F],CL
PUSH    DI
AND     [BX+SI],SP
AND     [BX+SI],AH
AND     [BX+SI],AH
SUB     AH,[BP+SI]
ADD     [DI],DH
AAS
DB      68
ADC     AX,2091
INTO
POP     CS
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
SUB     AH,[BP+SI]
CMP     CX,SI
POP     CS
AAA
SUB     [BP+DI],DI
AND     CH,[BP+SI]
AND     AL,[BX+SI]
INC     CX
AAS
DB      6D
ADC     AX,2091
INTO
POP     CS
SBB     CH,[BX+DI]
CMP     AX,[BX+SI]
PUSH    DX
AAS
JB      2E0D
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
PUSH    DS
ADD     [DI+3F],BL
JL      2E1E
XCHG    CX,AX
AND     [BP+SI],AH
SUB     AH,[BP+SI]
CMP     AX,[BX+SI]
DB      65
AAS
XCHG    [DI],DL
AND     WORD PTR [BX+SI],+49
ADD     [BP+DI+3F],CH
NOP
ADC     AX,0091
JA      2E5F
CALL    0F20:CA15
OR      CH,[SI]
POP     CS
SBB     AL,[BX+SI]
LAHF
AAS
MOVSB
ADC     AX,2091
AND     DL,[BP+4F]
PUSH    SP
INC     BP
PUSH    BX
AND     [BP+4F],AL
PUSH    DX
CMP     AH,[BP+SI]
CMP     CX,SI
POP     CS
CS:
SUB     [BP+DI],DI
AND     DL,[BP+4F]
PUSH    SP
INC     BP
PUSH    BX
AND     [BX+DI+47],AL
INC     CX
DEC     CX
DEC     SI
PUSH    BX
PUSH    SP
AND     AL,[BX+SI]
MOV     AL,3F
TEST    AX,8215
AND     [BX+DI+20],CL
OUT     20,AX
ADC     AH,[BX+SI]
INT     3
AND     [BX],CL
OR      AL,[BX+SI]
MOV     SP,AE3F
ADC     AX,20CA
POP     CS
OR      BP,[SI]
POP     CS
PUSH    DS
ADD     BL,DL
AAS
MOV     AX,9115
AND     [SI+46],DL
DEC     DI
PUSH    DX
CMP     CX,SI
POP     CS
XOR     BP,[BX+DI]
CMP     DX,[SI+41]
INC     DI
DEC     SI
```

```
PUSH    BX
PUSH    SP
ADD     BH,BL
AAS
RET     CA15
AND     [BX],CL
ADC     CH,[SI]
POP     CS
OR      AX,[BX+SI]
ADC     AX,[BX+SI-34]
ADC     AX,2091
PUSH    AX
DEC     SP
INC     CX
POP     CX
INC     BP
PUSH    DX
AND     AL,28
DEC     CX
SUB     [BP+DI],DI
INTO
POP     CS
AND     [BX+DI],BP
CMP     SP,[BP+SI]
PUSH    SI
DEC     DI
PUSH    SP
INC     BP
AND     [BP+4F],CL
PUSH    DI
AND     [BX+DI+3A],BL
INC     SI
DEC     DI
PUSH    DX
AND     [BX+SI],AH
AND     [BP+3A],CL
INC     CX
INC     DI
INC     CX
DEC     CX
DEC     SI
PUSH    BX
PUSH    SP
AND     BH,[BP+DI]
ADD     [D640],CH
ADC     AX,2085
INC     SP
INC     BP
INC     BX
DEC     CX
INC     SP
INC     BP
AND     AL,3A
RETF    0F20
ADC     CH,[SI]
POP     CS
CMP     AX,913A
AND     AH,[BX+SI]
AND     AL,[BX+SI]
POP     AX
INC     AX
FIST    DWORD PTR [DI]
RETF    0F20
ADC     AX,0F2C
SBB     AL,3A
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
ADD     [DI+E040],DL
ADC     AX,208B
INC     SP
INC     BP
INC     BX
DEC     CX
INC     SP
INC     BP
AND     AL,E7
AND     BL,[BX+DI+22]
AND     BH,CH
AND     [SI+45],AL
INC     BX
DEC     CX
INC     SP
INC     BP
AND     AL,E7
AND     BH,[BX+DI+22]
AND     CH,CL
AND     [SI+46],DL
DEC     DI
PUSH    DX
OUT     54,AX
INC     SI
DEC     DI
PUSH    DX
AND     CL,CH
SUB     [BP+57],DL
SUB     [BX+DI+29],CL
JMP     2F52
SUB     [BP+SI],DI
MOV     [BX+SI],SP
PUSH    CS
ADD     DX,[D400]
INC     AX
JMP     4420:8B15
INC     BP
INC     BX
DEC     CX
INC     SP
INC     BP
AND     AL,E7
AND     CL,[BP+22]
OUT     DX,AX
AND     [SI+45],AL
INC     BX
DEC     CX
INC     SP
INC     BP
AND     AL,E7
AND     CH,[BP+22]
AND     CH,CL
AND     [SI+41],DL
INC     DI
DEC     SI
PUSH    BX
PUSH    SP
OUT     54,AX
INC     CX
INC     DI
DEC     SI
PUSH    BX
PUSH    SP
JMP     85A1
PUSH    DI
SUB     [BX+DI+29],CL
JMP     2F91
SUB     [BP+SI],DI
MOV     [BX+SI],SP
PUSH    CS
ADD     DX,[E000]
INC     AX
HLT
ADC     AX,20CA
POP     CS
ADC     AX,0F2C
SBB     AL,00
ADD     AX,FE41
ADC     AX,2091
AND     CL,[BX+DI+4E]
INC     BX
DEC     DI
PUSH    DX
PUSH    DX
INC     BP
INC     BX
PUSH    SP
CS:
AND     [BP+4F],DL
PUSH    SP
INC     BP
AND     [BX+DI+20],BL
DEC     DI
PUSH    DX
AND     [BP+22],CL
CMP     CL,[BX+DI+0E20]
RET     0015
OR      AX,0341
PUSH    SS
AND     WORD PTR [BX+SI],+49
ADD     [BX+DI],BL
INC     CX
OR      [20CA],DL
POP     CS
OR      BP,[SI]
POP     CS
PUSH    DS
ADD     [BX+SI],DH
INC     CX
OR      DL,[2091]
PUSH    SP
INC     SI
DEC     DI
PUSH    DX
CMP     CX,SI
POP     CS
XOR     BP,[BX+DI]
CMP     DX,[SI+41]
INC     DI
DEC     SI
PUSH    BX
PUSH    SP
ADD     [SI],BH
INC     CX
OR      AX,CA16
AND     [BX],CL
ADC     AX,0F2C
SBB     AL,00
INC     DX
INC     CX
PUSH    CS
PUSH    SS
XCHG    CX,AX
ADD     [DI+41],BH
ADC     DL,[208B]
PUSH    SP
INC     CX
INC     DI
DEC     SI
PUSH    BX
PUSH    SP
OUT     E7,AL
PUSH    SP
INC     SI
DEC     DI
PUSH    DX
AND     CH,CL
AND     [BX+DI+CE20],DL
POP     CS
ADC     AX,3B29
AND     DL,[BX+SI+52]
DEC     DI
PUSH    AX
DEC     DI
```

```
PUSH    BX
INC     CX
DEC     SP
AND     [SI+45],AL
INC     SI
INC     BP
INC     CX
PUSH    SP
INC     BP
INC     SP
AND     BH,[BP+SI]
PUSH    BX
PUSH    DI
OUT     11,AX
CMP     CL,[BX+DI+0E20]
AND     [A100],DX
INC     CX
SBB     AL,16
XCHG    CX,AX
AND     DH,CL
POP     CS
ADC     AX,3B29
AND     DL,[BX+SI+52]
DEC     DI
PUSH    AX
DEC     DI
PUSH    BX
INC     CX
DEC     SP
AND     [BP+DI+41],AL
PUSH    DX
PUSH    DX
DEC     CX
INC     BP
INC     SP
AND     [BP+SI],SP
CMP     DL,[BP+DI+57]
OUT     12,AX
ADD     [BX+2141],DH
PUSH    SS
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [SI],BL
MOV     [BP+DI],DL
CMP     AL,[BP+DI+4920]
ADD     [DI+2641],BH
PUSH    SS
MOV     ES,[BX+SI]
FIADD   WORD PTR [BX+DI-80]
PUSH    SS
CMP     CL,[BX+44D9]
DEC     DI
DEC     SI
INC     BP
AND     [BX+DI+46],AL
PUSH    SP
INC     BP
PUSH    DX
AND     [BP+DI+45],DL
PUSH    SI
INC     BP
PUSH    DX
INC     CX
DEC     SP
AND     [BP+SI+4F],DL
PUSH    BP
DEC     SI
INC     SP
PUSH    BX
ADD     AH,AH
INC     CX
MOV     DL,[00C0]
SUB     AX,9442
PUSH    SS
XCHG    CX,AX
AND     AL,[BX+DI+54]
AND     [SI+48],DL
DEC     CX
PUSH    BX
AND     [BX+SI+4F],DL
DEC     CX
DEC     SI
PUSH    SP
AND     [BP+DI+45],DL
PUSH    SI
INC     BP
PUSH    DX
INC     CX
DEC     SP
AND     [BX+DI+44],AL
DEC     DX
PUSH    BP
PUSH    BX
PUSH    SP
DEC     BP
INC     BP
DEC     SI
PUSH    SP
PUSH    BX
AND     [BX+DI+52],AL
INC     BP
AND     [DI+41],CL
INC     SP
INC     BP
AND     [SI+4F],DL
AND     [BX+DI+4C],AL
DEC     SP
AND     [BX+SI+4C],DL
INC     CX
POP     CX
INC     BP
PUSH    DX
PUSH    BX
DAA
AND     [BX+DI+53],AL
PUSH    BX
INC     BP
PUSH    SP
PUSH    BX
AND     AL,[BX+SI]
AAA
INC     DX
TEST    AL,16
XCHG    CX,AX
CMP     DL,[BX+DI+913A]
ADD     [BP+DI+42],CH
MOV     DL,16
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
XOR     [BX+DI],BP
AND     [BX+SI+6C],DL
DB      61
JNS     3162
JB      3172
AND     [BP+SI+65],DH
DB      63
DB      65
DB      69
JBE     316C
AND     [BX+DI+6E],AH
AND     [BX+DI+6E],CH
DB      63
JB      3175
DB      61
JNB     3178
AND     [BX+DI+6E],CH
AND     [BX+DI+6E],CH
DB      63
DB      6F
DB      6D
DB      65
ADD     [BX+BC42],DL
PUSH    SS
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
DEC     SP
DB      6F
JA      3155
DB      69
DB      6E
DB      63
DB      6F
DB      6D
DB      65
AND     [BP+DI+69],AH
JZ      31A9
JPE     31A7
DB      6E
CMP     AH,[BX+SI]
AND     [SI],AH
XOR     AX,0022
LES     AX,[BP+SI-3A]
PUSH    SS
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
DEC     AX
DB      69
DB      67
DB      68
AND     [BX+DI+6E],CH
DB      63
DB      6F
DB      6D
DB      65
AND     [BP+DI+69],AH
JZ      31D6
JPE     31D4
DB      6E
CMP     AH,[BX+SI]
AND     AL,31
XOR     AX,0022
DB      F1
INC     DX
RCL     BYTE PTR [2291],1
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+DI+6C],AL
DB      6C
AND     [BX+74],CH
DB      68
DB      65
JB      3207
CMP     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [SI],AH
XOR     [BX+SI],SI
AND     AL,[BX+SI]
SBB     AX,DA43
PUSH    SS
XCHG    CX,AX
AND     AH,[BX+SI]
```

```
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BP+SI],DH
SUB     [BX+SI],SP
PUSH    AX
DB      6C
DB      61
JNS     321D
JB      322D
AND     [BX+SI+61],DH
JNS     31DF
JZ      3222
JS      3228
JNB     31E5
DB      6F
DB      66
AND     [SI],AH
XOR     AH,[BX+SI]
DB      65
DB      61
DB      63
DB      68
ADD     [BX+43],CH
IN      AL,16
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BP+DI],DH
SUB     [BX+SI],SP
DEC     CX
DB      66
AND     [BX+DI+6F],BH
JNZ     3258
AND     [DI+6F],CH
DB      6E
DB      65
JNS     320D
DB      68
DB      61
JNB     3211
DB      66
DB      61
DB      6C
DB      6C
DB      65
DB      6E
AND     [BP+SI+65],AH
DB      6C
DB      6F
JA      321E
AND     AL,31
XOR     AX,202C
JA      326A
DB      6C
DB      66
DB      61
JB      326F
AND     [SI+65],AH
DB      63
JB      3275
DB      61
JNB     3278
JNB     3235
DB      62
JNS     3238
XOR     [BX+SI],SP
AND     BH,[BP+DI]
CALL    [BP+1328]
SUB     [BX+SI],AX
MOV     DX,EE43
PUSH    SS
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [SI],DH
SUB     [BX+SI],SP
DEC     CX
DB      66
AND     [BX+DI+6F],BH
JNZ     32AA
AND     [DI+6F],CH
DB      6E
DB      65
JNS     325F
DB      69
JNB     3262
DB      61
DB      62
DB      6F
JBE     32AC
AND     [SI],AH
XOR     DH,[BX+SI]
XOR     [SI],CH
AND     [BX+65],DH
DB      6C
DB      66
DB      61
JB      32BA
AND     [BX+DI+6E],CH
DB      63
JB      32C0
DB      61
JNB     32C3
JNB     3280
DB      62
JNS     3283
XOR     [BX+SI],SP
AND     BH,[BP+DI]
CALL    [BP+1328]
SUB     [BX+SI],AX
IN      AX,43
CLC
PUSH    SS
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [DI],DH
SUB     [BX+SI],SP
PUSH    AX
DB      6F
JO      32F5
DB      6C
DB      61
JZ      32ED
DB      6F
DB      6E
AND     [BX+DI+6E],CH
DB      63
JB      32F1
DB      61
JNB     32F4
JNB     32B1
DB      62
JNS     32B4
XOR     AH,[DI]
AND     AL,[BX+SI]
CS:
INC     SP
ADD     DL,[BX]
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [2029],DH
PUSH    SP
DB      68
DB      65
AND     [BP+61],DH
DB      63
DB      61
DB      6E
DB      63
JNS     32D3
JB      3316
JZ      331C
AND     [BX+DI+64],AH
DB      6A
JNZ     3330
JZ      3332
AND     [SI+6F],DH
AND     [SI+68],DH
DB      69
JNB     32E8
DB      6E
DB      65
JA      32EC
JO      333D
JO      3345
DB      6C
DB      61
JZ      333D
DB      6F
DB      6E
AND     [BX+DI+6E],CH
DB      63
JB      3341
DB      61
JNB     3344
AND     AL,[BX+SI]
JNO     3327
OR      AL,17
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX],DH
SUB     [BX+SI],SP
INC     DX
DB      65
DB      63
DB      61
JNZ     3369
DB      65
AND     [BX+SI+6F],DH
JO      3371
DB      6C
DB      61
JZ      3369
DB      6F
DB      6E
AND     [BX+SI+61],CH
JNB     3327
DB      69
DB      6E
DB      63
JB      3371
DB      61
JNB     3374
DB      64
SUB     AL,20
JB      3383
DB      61
DB      64
JNB     3338
DB      61
DB      6E
DB      64
AND     [BX+74],CH
DB      68
DB      65
JB      3342
AND     AL,[BX+SI]
MOV     BP,1644
POP     SS
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
DB      69
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DB      6E
DB      66
JB      3399
JNB     33AE
JB      33B1
DB      63
JZ      33B4
JB      33A6
AND     [BX+DI+73],CH
AND     [BP+6F],CH
JA      3369
DB      69
DB      6E
DB      61
DB      64
DB      65
JNO     33C5
DB      61
JZ      33B8
CS:
AND     [BP+DI+75],DL
DB      62
JZ      33CC
DB      61
DB      63
JZ      337E
XOR     [BX+SI],SP
AND     BH,[BP+DI]
CALL    [BP+1328]
SUB     [BP+DI],DI
AND     AH,[BX+SI]
DB      66
JB      33DC
DB      6D
AND     AL,[BX+SI]
FIADD   DWORD PTR [SI+20]
POP     SS
XCHG    CX,AX
AND     AH,[BX+SI]
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
AND     [BX+SI],AH
DB      65
DB      61
DB      63
DB      68
AND     [BX+65],DH
DB      6C
DB      66
DB      61
JB      33F0
AND     AL,[BX+SI]
LOOP    33D3
SUB     DL,[BX]
XCHG    CX,AX
CMP     DL,[BX+DI+0A00]
INC     BP
XOR     AL,17
XCHG    CX,AX
AND     DH,CL
POP     CS
SBB     BP,[BX+DI]
CMP     SP,[BX+SI]
AND     DL,[BX+SI+52]
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [SI+4F],DL
AND     [BP+DI+4F],AL
DEC     SI
PUSH    SP
DEC     CX
DEC     SI
PUSH    BP
INC     BP
AND     AL,[BX+SI]
ADC     AX,[DI+3E]
POP     SS
INC     CX
AND     AL,E7
FIADD   WORD PTR [BX+SI]
AND     AX,4845
POP     SS
MOV     SP,[BX+SI]
INC     CX
AND     AL,E7
AND     AH,[BP+SI]
AND     CH,CL
AND     [173E],CL
ADD     [DI],BH
INC     BP
PUSH    DX
POP     SS
CMP     CL,[BX+41D9]
INC     SP
INC     SP
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
AND     [SI+4F],DL
AND     [BX+DI+4C],AL
DEC     SP
ADD     [BP+45],CL
POP     SP
POP     SS
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
DB      6B
INC     BP
DB      66
POP     SS
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     BH,AH
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     CL,CH
AND     [BX],CL
OR      AL,[BX+SI]
JNS     3465
DB      6F
POP     SS
INC     SI
DEC     DI
PUSH    DX
DEC     BP
INC     CX
PUSH    SP
AND     [BP+DI+3A],AL
ADD     [BP+7045],BL
POP     SS
MOV     SP,[BX+SI]
DEC     CX
AND     BH,AH
AND     [BX+DI],BL
AND     CH,CL
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI],BL
SUB     DI,SP
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI],BL
SUB     [BX+SI],SP
JMP     C500:1620
INC     BP
JPE     346C
MOV     SP,[BX+SI]
DEC     CX
AND     BH,AH
AND     [BX],CL
OR      AH,[BX+SI]
INT     20
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX],CL
OR      CH,[BX+DI]
OUT     20,AX
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX],CL
OR      CH,[BX+DI]
AND     CL,CH
PUSH    SS
ADD     CH,CL
INC     BP
TEST    [BX],DL
AND     WORD PTR [BX+SI],+49
ADD     BL,AH
INC     BP
MOV     SS,[BX]
CMP     CL,[BX+20D9]
INC     BX
DEC     DI
DEC     SP
DEC     SP
INC     BP
INC     BX
PUSH    SP
AND     [SI+41],DL
POP     AX
INC     BP
PUSH    BX
ADD     AH,DH
INC     BP
CBW
POP     SS
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
POP     CS
INC     SI
MOV     [4D17],AL
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     BH,AH
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
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AND     DL,CH
ADC     AX,[BX+SI]
POP     SS
INC     SI
LODSB
POP     SS
AND     WORD PTR [BX+SI],+49
ADD     [SI],CH
INC     SI
MOV     DH,17
CMP     CL,[BX+20D9]
DEC     CX
DEC     SI
INC     BX
PUSH    DX
INC     BP
INC     CX
PUSH    BX
INC     BP
AND     [BX+SI+4F],DL
PUSH    AX
ADD     [DI+46],AL
DB      C0
POP     SS
PUSH    AX
DEC     DI
PUSH    AX
OUT     50,AX
DEC     DI
PUSH    AX
AND     CL,CH
SUB     [DI],BL
OR      DL,BH
AND     DI,[BP+DI-15]
PUSH    AX
DEC     DI
PUSH    AX
SUB     [BX+SI],AX
POP     BX
INC     SI
RETF    3A17
POP     CX
INC     CX
INC     SP
DEC     DX
PUSH    BP
PUSH    BX
PUSH    SP
AND     [BP+43],DL
AND     [BP+SI+41],DL
PUSH    SP
INC     BP
ADD     [BX+46],AH
AAM     17
PUSH    SI
INC     BX
OUT     56,AX
INC     BX
JMP     468C:0013
FICOM   WORD PTR [BX]
CMP     CL,[BX+43D9]
DEC     AX
INC     BP
INC     BX
DEC     BX
AND     [BX+45],DL
DEC     SP
INC     SI
INC     CX
PUSH    DX
INC     BP
AND     [BP+53],DL
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
AND     [SI+45],CL
PUSH    SI
INC     BP
DEC     SP
PUSH    BX
ADD     [DI+E846],BL
POP     SS
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
DB      C9
INC     SI
REPNZ
POP     SS
MOV     SP,[BX+SI]
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     AL,CH
AND     [BX],CL
ADC     AL,20
INT     20
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     BH,AH
AND     [BX+45],DL
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     DL,CH
AND     [BP+SI],DL
ADD     BL,DH
INC     SI
CLD
POP     SS
MOV     SP,[BX+SI]
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     DH,AH
OUT     0F,AX
DB      C8
AND     CH,CL
AND     [BX+45],DL
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     BH,AH
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     CL,CH
ADC     AL,[BX+SI]
STI
INC     SI
PUSH    ES
SBB     [BP+DI+4920],AL
ADD     [BP+SI],BH
INC     DI
ADC     [BX+SI],BL
CMP     CL,[BX+20D9]
INC     CX
DEC     SP
DEC     SP
AND     [BX+45],DL
DEC     SP
INC     SI
INC     CX
PUSH    DX
INC     BP
AND     [SI+45],AL
INC     BX
PUSH    DX
INC     BP
INC     CX
PUSH    BX
INC     BP
PUSH    BX
AND     [SI+55],AL
INC     BP
AND     [SI+4F],DL
AND     [BX+DI+4E],CL
INC     CX
INC     SP
INC     BP
PUSH    CX
PUSH    BP
INC     CX
PUSH    SP
INC     BP
AND     [BX+DI+4E],CL
INC     SI
PUSH    DX
INC     CX
PUSH    BX
PUSH    SP
PUSH    DX
PUSH    BP
INC     BX
PUSH    SP
PUSH    BP
PUSH    DX
INC     BP
ADD     [BP+DI+47],CL
SBB     BL,[BX+SI]
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
DB      64
INC     DI
AND     AL,18
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     BH,AH
AND     [BX+45],DL
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     DL,CH
ADC     AL,[BX+SI]
DB      6C
INC     DI
CS:
SBB     [BP+DI+4920],AL
ADD     [BX+SI+3847],CL
SBB     [BP+SI],BH
POP     CX
AND     [BX+DI+20],AL
INC     BX
DEC     AX
INC     CX
DEC     SI
INC     BX
INC     BP
AND     [BX+43],CL
INC     BX
PUSH    BP
PUSH    DX
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PUSH    DX
INC     BP
DEC     SI
INC     BX
INC     BP
ADD     [BP+SI+4247],DL
SBB     [DI+0E20],CL
DB      6E
SBB     [BX+SI],AX
TEST    AX,4C47
SBB     [BP+SI],BH
POP     CX
INC     BX
DEC     AX
INC     BP
INC     BX
DEC     BX
AND     [BX+SI+41],DL
PUSH    DX
DEC     BX
AND     [BP+55],AL
DEC     SI
INC     SP
ADD     [BX+5147],CH
SBB     AL,AL
ADD     AL,CL
INC     DI
PUSH    SI
SBB     [BP+DI+5020],CL
INC     SI
PUSH    BP
DEC     SI
INC     SP
AND     AL,CH
AND     [BX],CL
PUSH    DS
AND     CH,CL
AND     [BX+DI+0E20],CL
OR      BL,[BX+DI]
ADD     BL,DL
INC     DI
MOV     DX,CA18
AND     [BX],CL
OR      AL,2C
ADC     AL,[BX+SI]
OR      AL,48
LES     BX,[BX+SI]
XCHG    CX,AX
AND     BL,[BX+DI+4F]
PUSH    BP
AND     [BP+4F],CL
PUSH    DI
AND     [BX+SI+41],CL
PUSH    SI
INC     BP
AND     [DI+4E],AL
DEC     DI
PUSH    BP
INC     DI
DEC     AX
AND     [BP+55],AL
DEC     SI
INC     SP
PUSH    BX
AND     [SI+4F],DL
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
AND     [BX+DI+20],AL
INC     SI
PUSH    DX
INC     BP
INC     BP
AND     [BX+SI+41],DL
PUSH    DX
DEC     BX
AND     [BP+SI],SP
ADD     [SI],DL
DEC     AX
INTO
SBB     [BX+DI+913A],DL
ADD     [BP+DI+48],BL
FCOMP   DWORD PTR [BX+SI]
XCHG    CX,AX
AND     DL,[BX+SI+52]
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [SI+4F],DL
AND     [BP+SI+45],DL
PUSH    SP
PUSH    BP
PUSH    DX
DEC     SI
AND     [SI+4F],DL
AND     [SI+48],DL
INC     BP
AND     [BX+41],AL
DEC     BP
INC     BP
AND     [DI+45],CL
DEC     SI
PUSH    BP
AND     [BX+DI+4E],AL
INC     SP
AND     [BP+DI+48],AL
DEC     DI
DEC     DI
PUSH    BX
INC     BP
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     [DI],DH
AND     [BX+52],CL
AND     AL,[BX+SI]
SAHF
DEC     AX
LOOP    372A
XCHG    CX,AX
AND     CL,[BX+SI+4F]
DEC     SP
INC     SP
AND     [BX+4E],CL
PUSH    SP
DEC     DI
AND     [SI+48],DL
DEC     CX
PUSH    BX
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
AND     [BX+DI+4E],AL
INC     SP
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
AND     [SI+48],DL
INC     BP
AND     [BX+SI+41],DL
PUSH    DX
DEC     BX
AND     [SI+41],CL
PUSH    SP
INC     BP
PUSH    DX
AND     [BX+DI+4E],CL
AND     [SI+48],DL
INC     BP
AND     [BX+41],AL
DEC     BP
INC     BP
AND     AL,[BX+SI]
TEST    AX,E748
SBB     DL,CL
AND     [BX],CL
ADC     AX,122C
ADD     AL,DL
DEC     AX
IN      AL,DX
SBB     [BX+DI+CE20],DL
POP     CS
SBB     BP,[BX+DI]
CMP     SP,[BP+SI]
PUSH    AX
PUSH    DX
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [SI+4F],DL
AND     [BP+DI+4F],AL
DEC     SI
PUSH    SP
DEC     CX
DEC     SI
PUSH    BP
INC     BP
AND     AL,[BX+SI]
ESC     09,[BX+SI-0A][BX+SI+18]
INC     CX
AND     AL,E7
FIADD   WORD PTR [BX+SI]
JMP     37D6
ADD     [BX+DI],BL
MOV     SP,[BX+SI]
INC     CX
AND     AL,E7
AND     AH,[BP+SI]
AND     CH,CL
AND     [18F6],CL
ADD     CL,DH
DEC     AX
OR      BL,[BX+DI]
MOV     ES,[BX+SI]
ADD     [BX+DI+6E],CL
SBB     [BP+SI],DI
POP     CX
AND     [BP+DI+68],AH
DB      61
DB      6E
DB      63
DB      65
ADD     [SI],AH
DEC     CX
JS      37D0
CMP     CL,[BX+20D9]
PUSH    AX
DEC     CX
INC     BX
DEC     BX
AND     [BX+DI+20],AL
INC     BX
DEC     AX
INC     CX
DEC     SI
INC     BX
INC     BP
```

```
AND     [BP+SI+41],DL
DEC     SI
INC     SP
DEC     DI
DEC     BP
AND     [BP+55],CL
DEC     BP
INC     DX
INC     BP
PUSH    DX
ADD     [BP+SI],CH
DEC     CX
JGE     37F4
DB      C0
ADD     [DI],BH
DEC     CX
SBB     BYTE PTR [BX+DI],B9
AND     BH,BH
XCHG    SP,AX
SUB     BH,BH
SUB     BYTE PTR [BX+SI],FE
MOV     CS,[SI]
ADC     BP,[BX+DI]
SUB     [BX+SI],AX
POP     CX
DEC     CX
SBB     BYTE PTR [BX+DI],88
AND     [BP+DI+48],AL
DEC     SI
PUSH    BP
DEC     BP
AND     BH,AH
AND     BH,BH
TEST    [BX+SI],BP
DEC     WORD PTR [BX+SI+EB20]
AND     [BX+DI],BL
AND     CL,CH
ADC     CH,[BX+DI]
ADD     [BX+49],DH
MOV     [BX+DI],DS
XCHG    BP,AX
AND     [BP+DI+48],AL
DEC     SI
PUSH    BP
DEC     BP
AND     [BX+DI+0E20],CL
MOV     AL,[2C19]
PUSH    CS
LOCK
SBB     [SI],BP
PUSH    CS
INC     AX
SBB     CH,[SI]
PUSH    CS
CALL    4981:001A
XCHG    SI,AX
SBB     [BX+DI+0E20],CX
HLT
SBB     AL,[BX+SI]
XCHG    BP,AX
DEC     CX
MOV     AL,[3A19]
POP     CX
INC     SI
DEC     CX
PUSH    DX
PUSH    BX
PUSH    SP
AND     [BP+DI+48],AL
INC     CX
DEC     SI
INC     BX
INC     BP
ADD     [BX+DI+AA49],AH
SBB     DX,CX
AND     [BX],CL
OR      AL,2C
POP     CS
POP     SS
ADD     DL,CL
DEC     CX
MOV     AH,19
XCHG    CX,AX
AND     AL,[BP+45]
INC     SP
INC     BP
PUSH    DX
INC     CX
DEC     SP
AND     [BP+55],AL
DEC     SI
INC     SP
DEC     CX
DEC     SI
INC     DI
AND     [BP+4F],AL
PUSH    DX
AND     [BP+SI+4F],DL
INC     CX
INC     SP
PUSH    BX
AND     [BX+DI+53],CL
AND     [BP+DI+55],AL
PUSH    SP
CS:
AND     AL,[BX+SI]
POP     CS
DEC     DX
MOV     SI,9119
AND     DH,CL
POP     CS
OR      AL,29
CMP     SP,[BP+SI]
INC     CX
DEC     SP
DEC     SP
AND     [BX+DI+52],AL
INC     BP
AND     [BX+DI+53],AL
PUSH    BX
INC     BP
PUSH    BX
PUSH    BX
INC     BP
INC     SP
AND     [BX+DI+54],AL
AND     [SI],AH
XOR     AX,4620
DEC     DI
PUSH    DX
AND     [BP+DI+4F],AL
DEC     SI
PUSH    SP
DEC     CX
DEC     SI
PUSH    BP
DEC     CX
DEC     SI
INC     DI
AND     [BP+SI+4F],DL
INC     CX
INC     SP
AND     [DI+41],CL
DEC     CX
DEC     SI
PUSH    SP
INC     BP
DEC     SI
INC     CX
DEC     SI
INC     BX
INC     BP
AND     [BP+SI],SP
ADD     [BX+SI],AH
DEC     DX
DB      C8
SBB     [BP+SI+4920],AX
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
CMP     CX,[BP+SI-2E]
SBB     [DI+4F],CX
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     BH,AH
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     DL,CH
PUSH    SS
ADD     [BP+DI+4A],AL
FCOMP   QWORD PTR [BX+DI]
AND     WORD PTR [BX+SI],+49
ADD     [DI+4A],CL
OUT     19,AL
MOV     [BX+SI],SP
PUSH    CS
LOOPNZ  3919
ADD     [BP+DI+4A],AH
LOCK
SBB     [BP+SI],DI
POP     CX
AND     [BP+DI+45],DL
INC     BX
DEC     DI
DEC     SI
INC     SP
AND     [BP+DI+48],AL
INC     CX
DEC     SI
INC     BX
INC     BP
ADD     [BP+4A],CH
CLI
SBB     DX,CX
AND     [BX],CL
OR      AL,2C
PUSH    SS
ADD     [SI+044A],DH
SBB     DL,[BX+DI+4622]
DEC     CX
PUSH    DX
INC     BP
AND     [BX+DI+54],AL
AND     [BX+DI+20],AL
DEC     SP
DEC     DI
INC     BX
INC     CX
DEC     SP
AND     [BX+DI+4E],CL
INC     SP
PUSH    BP
PUSH    BX
PUSH    SP
PUSH    DX
POP     CX
AND     [BP+DI+41],AL
PUSH    BP
PUSH    BX
INC     BP
PUSH    BX
AND     [BX+SI+4F],DL
DEC     SP
DEC     SP
PUSH    BP
PUSH    SP
DEC     CX
```

```
DEC     SI
INC     DI
AND     [BP+DI+4D],DL
DEC     DI
DEC     BX
INC     BP
AND     [BX+56],CL
INC     BP
PUSH    DX
AND     [SI+48],DL
INC     BP
AND     [BP+DI+49],AL
PUSH    SP
POP     CX
AND     [BP+SI],SP
ADD     [BX],CL
DEC     BX
PUSH    CS
SBB     DL,[BX+DI+4D22]
INC     CX
DEC     SI
POP     CX
AND     [BX+DI+52],AL
INC     BP
INC     CX
PUSH    BX
AND     [BX+46],CL
AND     [SI+48],DL
INC     BP
AND     [BP+DI+49],AL
PUSH    SP
POP     CX
AND     [DI+55],CL
PUSH    BX
PUSH    SP
AND     [BP+SI+45],AL
AND     [DI+56],AL
INC     CX
INC     BX
PUSH    BP
INC     CX
PUSH    SP
INC     BP
INC     SP
CS:
AND     [DI+56],AL
INC     BP
PUSH    DX
POP     CX
DEC     DI
DEC     SI
INC     BP
DAA
PUSH    BX
AND     [BX+45],DL
DEC     SP
INC     SI
INC     CX
PUSH    DX
INC     BP
AND     [SI+45],AL
INC     BX
PUSH    DX
INC     BP
INC     CX
PUSH    BX
INC     BP
PUSH    BX
AND     [BP+SI+59],AL
AND     [BX+DI],DH
AND     [BP+SI],AH
CMP     SP,[BX+SI]
CALL    [BP+1328]
SUB     [BX+SI],AX
AND     [BP+DI+18],CL
SBB     AL,[BP+SI+4920]
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
CMP     [BP+DI+22],CX
SBB     DL,[BX+45]
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     BH,AH
AND     [BX+45],DL
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     DL,CH
ADC     AL,[BX+SI]
INC     CX
DEC     BX
SUB     AL,1A
AND     WORD PTR [BX+SI],+49
ADD     [BP+DI+4B],CL
SS:
SBB     CL,[BX+DI+0E20]
LOOPNZ  3A17
ADD     [BX+SI+4B],AH
INC     AX
SBB     BH,[BP+SI]
POP     CX
AND     [SI+48],DL
DEC     CX
PUSH    DX
INC     SP
AND     [BP+DI+48],AL
INC     CX
DEC     SI
INC     BX
INC     BP
ADD     [DI+4B],CH
DEC     DX
SBB     CL,DL
AND     [BX],CL
OR      AL,2C
AND     [BX],CL
ADC     AX,[BX+SI]
MOVSW
DEC     BX
PUSH    SP
SBB     DL,[BX+DI+4C22]
DEC     DI
INC     BX
INC     CX
DEC     SP
AND     [BX+DI+4E],CL
INC     SP
PUSH    BP
PUSH    BX
PUSH    SP
PUSH    DX
POP     CX
AND     [BX+SI+4F],DL
DEC     SP
DEC     SP
PUSH    BP
PUSH    SP
INC     CX
DEC     SI
PUSH    SP
PUSH    BX
AND     [BP+DI+49],DL
DEC     SI
DEC     BX
AND     [BX+DI+4E],CL
PUSH    SP
DEC     DI
AND     [SI+48],DL
INC     BP
AND     [BX+DI+51],AL
PUSH    BP
DEC     CX
INC     SI
INC     BP
PUSH    DX
AND     [BP+SI],SP
ADD     AL,DH
DEC     BX
POP     SI
SBB     DL,[BX+DI+CE20]
SBB     CH,[BX+DI]
CMP     SP,[BP+SI]
INC     CX
DEC     SP
DEC     SP
AND     [BP+DI+49],AL
PUSH    SP
DEC     CX
POP     DX
INC     BP
DEC     SI
PUSH    BX
AND     [BX+SI+41],DL
POP     CX
AND     [SI],AH
XOR     [DI],SI
AND     [BP+4F],AL
PUSH    DX
AND     [SI+45],DL
DEC     BP
PUSH    AX
DEC     DI
PUSH    DX
INC     CX
PUSH    DX
POP     CX
AND     [BP+SI+4F],AL
PUSH    SP
PUSH    SP
DEC     SP
INC     BP
INC     SP
AND     [BX+41],DL
PUSH    SP
INC     BP
PUSH    DX
AND     [BX+DI+4E],AL
INC     SP
AND     [BP+DI+4C],AL
INC     BP
INC     CX
DEC     SI
AND     [DI+50],DL
AND     [BP+SI],SP
ADD     [684C],AH
SBB     DL,[BX+DI+CE20]
POP     CS
PUSH    SS
SUB     [BP+DI],DI
AND     AL,[DI+56]
INC     BP
PUSH    DX
POP     CX
DEC     DI
DEC     SI
INC     BP
DAA
PUSH    BX
AND     [BX+45],DL
DEC     SP
INC     SI
INC     CX
PUSH    DX
INC     BP
AND     [SI+45],AL
INC     BX
PUSH    DX
INC     BP
INC     CX
PUSH    BX
```

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INC     BP
PUSH    BX
AND     [BP+SI+59],AL
AND     [BX+DI],DH
AND     [BP+SI],AH
CMP     DI,DI
XCHG    SI,AX
SUB     [BP+DI],DL
SUB     [BX+SI],AX
AAA
DEC     SP
JB      3AF7
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
PUSH    BX
DEC     SP
JL      3B08
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     BH,AH
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     DL,CH
POP     CS
POP     CS
ADD     [SI+4C],CH
XCHG    [BP+SI],BL
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     BH,AH
AND     [BX+45],DL
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     DL,CH
ADC     AL,[BX+SI]
JZ      3B6D
NOP
SBB     AL,[BP+DI+4920]
ADD     [BP+4C],BH
XCHG    BP,AX
SBB     CL,[BX+DI+0E20]
LOOPNZ  3B4A
ADD     [BP+DI+9A4C],DL
SBB     BH,[BP+SI]
POP     CX
INC     SI
DEC     DI
PUSH    BP
PUSH    DX
PUSH    SP
DEC     AX
AND     [BP+DI+48],AL
INC     CX
DEC     SI
INC     BX
INC     BP
ADD     [BP+9F4C],BL
SBB     CL,DL
AND     [BX],CL
OR      AL,2C
ADC     AL,[BX+SI]
JMP     3B9F
MOVSB
SBB     DL,[BX+DI+4122]
AND     [SI+4F],CL
INC     BX
INC     CX
DEC     SP
AND     [BX+SI+48],DL
DEC     CX
DEC     SP
INC     CX
DEC     SI
PUSH    SP
DEC     AX
PUSH    DX
DEC     DI
PUSH    AX
DEC     CX
PUSH    BX
PUSH    SP
AND     [SI+49],AL
INC     BP
PUSH    BX
AND     [BX+DI+4E],AL
INC     SP
AND     [SI+45],CL
INC     CX
PUSH    SI
INC     BP
PUSH    BX
AND     [SI+48],DL
INC     BP
AND     [BP+DI+49],AL
PUSH    SP
POP     CX
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
AND     [BP+4F],AL
PUSH    DX
AND     [BX+DI+20],AL
DEC     SI
INC     BP
PUSH    DI
AND     [BX+SI+41],DL
PUSH    DX
DEC     BX
AND     [BP+SI],SP
ADD     [AE4D],BH
SBB     DL,[BX+DI+5422]
DEC     AX
INC     BP
AND     [BX+SI+41],DL
PUSH    DX
DEC     BX
AND     [BP+55],AL
DEC     SI
INC     SP
AND     [BX+DI+4E],CL
INC     BX
PUSH    DX
INC     BP
INC     CX
PUSH    BX
INC     BP
PUSH    BX
AND     [BP+SI+59],AL
AND     [SI],AH
XOR     [BX+SI],SI
AND     [BX+DI+4E],AL
INC     SP
AND     [DI+56],AL
INC     BP
PUSH    DX
POP     CX
DEC     DI
DEC     SI
INC     BP
DAA
PUSH    BX
AND     [BX+45],DL
DEC     SP
INC     SI
INC     CX
PUSH    DX
INC     BP
AND     [BX+DI+4E],CL
INC     BX
PUSH    DX
INC     BP
INC     CX
PUSH    BX
INC     BP
PUSH    BX
AND     [BP+SI+59],AL
AND     [BX+DI],DH
AND     [BP+SI],AH
CMP     DI,DI
XCHG    SI,AX
SUB     [BP+DI],DL
SUB     [BX+SI],AX
PUSH    BP
DEC     BP
MOV     AX,501A
INC     SI
PUSH    BP
DEC     SI
INC     SP
AND     BH,AH
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     CL,CH
AND     [BX],CL
OR      AL,[BX+SI]
DB      66
DEC     BP
RET     821A
AND     [BX+DI+20],CL
OUT     20,AX
ADC     AH,[BX+SI]
INT     3
AND     [BX],CL
OR      AL,[BX+SI]
JG      3C68
INT     3
SBB     DL,[BX+45]
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     BH,AH
AND     [BX+45],DL
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     CL,CH
ADC     AL,[BX+SI]
XCHG    [DI-2A],CX
SBB     AL,[BP+DI+4920]
ADD     [BP+DI+E04D],DL
SBB     CL,DL
AND     [BX],CL
ADC     AX,0F2C
SBB     AX,[BX+SI]
MOV     AH,4D
JMP     5022:911A
PUSH    DX
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [SI+4F],DL
AND     [BP+DI+4F],AL
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```
DEC     SI
PUSH    SP
DEC     CX
DEC     SI
PUSH    BP
INC     BP
AND     AL,[BX+SI]
MOV     BP,EC4D
SBB     AL,[BX+DI+24]
OUT     DE,AX
ADD     BH,CL
DEC     BP
IN      AX,DX
SBB     CL,[BP+DI+4120]
AND     AL,E7
AND     AH,[BP+SI]
AND     CH,CL
AND     [1AEC],CL
ADD     CH,DL
DEC     BP
HLT
SBB     CL,[BP+F800]
DEC     BP
CALL    FAR [BP+SI]
CMP     CL,[BX+20D9]
PUSH    BX
INC     BP
PUSH    SP
AND     [SI+49],DL
INC     BP
SUB     AX,4544
PUSH    SI
INC     BP
DEC     SP
SUB     AX,4F54
SUB     AX,4356
AND     [BP+DI+57],DL
DEC     CX
PUSH    SP
INC     BX
DEC     AX
ADD     [SI],CL
DEC     SI
ADD     BX,[BP+DI]
CMP     CL,[BX+52D9]
INC     BP
PUSH    BX
INC     BP
PUSH    SP
AND     [BP+DI+57],DL
DEC     CX
PUSH    SP
INC     BX
DEC     AX
ADD     [BP+SI],BL
DEC     SI
OR      [BP+DI],BL
DEC     SI
DEC     DI
INC     SP
INC     BP
PUSH    SI
AND     BH,AH
AND     [BX+00],CL
INC     SP
DEC     SI
ADC     BL,[BP+DI]
CMP     CL,[BX+43D9]
DEC     AX
INC     BP
INC     BX
DEC     BX
AND     [BP+4F],AL
PUSH    DX
AND     [BP+DI+4F],AL
DEC     SI
INC     SP
DEC     CX
PUSH    SP
DEC     CX
DEC     DI
DEC     SI
PUSH    BX
AND     [BP+4F],CL
PUSH    SP
AND     [SI+4F],DL
AND     [BP+SI+45],AL
AND     [DI+45],CL
PUSH    SP
ADD     [BP+DI+4E],AH
SBB     AL,1B
MOV     SP,[BX+SI]
PUSH    SP
DEC     CX
INC     BP
AND     BH,AH
AND     [BX+DI],DL
AND     BH,CH
AND     [BP+43],DL
AND     AL,CH
AND     [CD20],DL
AND     [BX+DI+0E20],CL
MOV     SP,001B
MOV     [BP+26],CL
SBB     DI,[BP+SI]
POP     CX
DEC     CX
INC     SI
AND     [BX+SI+45],CL
PUSH    DX
INC     BP
SUB     AL,20
PUSH    SP
DEC     AX
INC     BP
DEC     SI
AND     [SI+49],DL
INC     BP
CMP     AX,2031
INC     CX
DEC     SI
INC     SP
AND     [BP+43],DL
DS:
CMP     AX,0035
SCASB
DEC     SI
XOR     [BP+DI],BL
MOV     SP,[BX+SI]
PUSH    SP
AND     AL,28
PUSH    DX
DEC     DI
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     2029:400F
CALL    5E39
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
AND     CH,CL
AND     [BX+DI+0E20],CL
MOV     SP,001B
LES     CX,[BP+3A]
SBB     DI,[BP+SI]
POP     CX
PUSH    SP
PUSH    BP
PUSH    DX
DEC     SI
AND     [BX+4E],CL
AND     [BP+DI+57],DL
DEC     CX
PUSH    SP
INC     BX
DEC     AX
ADD     DL,DL
DEC     SI
INC     SP
SBB     CX,[BP+4F]
INC     SP
INC     BP
PUSH    SI
AND     BH,AH
AND     [BP+SI],DL
ADD     AL,BL
DEC     SI
DEC     SI
SBB     AX,AX
ADD     BH,BH
DEC     SI
PUSH    DI
SBB     DX,[BX+DI+2220]
INC     BX
DEC     DI
PUSH    AX
POP     CX
PUSH    DX
DEC     CX
INC     DI
DEC     AX
PUSH    SP
CMP     AH,[BX+SI]
PUSH    BX
PUSH    BP
PUSH    BX
INC     CX
DEC     SI
AND     [DI+4C],AL
PUSH    BX
DEC     AX
INC     CX
PUSH    DI
AND     [SI+48],DL
PUSH    DX
INC     CX
DEC     SP
DEC     SP
AND     AL,[BX+SI]
PUSH    AX
DEC     DI
POP     AX
SBB     DX,[BX+DI+5922]
DEC     DI
PUSH    BP
AND     [BX+SI+41],CL
PUSH    SI
INC     BP
AND     [BP+DI+48],AL
DEC     DI
PUSH    BX
INC     BP
DEC     SI
AND     [SI+4F],DL
AND     [SI+49],DL
INC     BP
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
DEC     BP
INC     BP
DEC     SI
PUSH    SP
AND     [SI+4F],DL
AND     [SI+48],DL
INC     BP
AND     [BP+41],DL
INC     BX
INC     CX
```

```
DEC     SI
INC     BX
POP     CX
AND     [BP+SI+41],DL
PUSH    SP
INC     BP
CS:
AND     [BP+DI+49],DL
DEC     SI
INC     BX
INC     BP
AND     [SI+48],DL
INC     BP
AND     [BP+41],DL
INC     BX
INC     CX
DEC     SI
INC     BX
POP     CX
AND     AL,[BX+SI]
LAHF
DEC     DI
POP     BP
SBB     DX,[BX+DI+5222]
INC     CX
PUSH    SP
INC     BP
AND     [BX+DI+53],CL
AND     [BX+DI+42],AL
DEC     DI
PUSH    SI
INC     BP
AND     [SI],DH
AND     AX,5920
DEC     DI
PUSH    BP
AND     [DI+41],CL
POP     CX
AND     [BP+4F],CL
PUSH    SP
AND     [SI+45],AL
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
AND     [SI+48],DL
DEC     CX
PUSH    BX
AND     [BP+DI+45],DL
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     [BX+DI+54],AL
AND     [SI+48],DL
DEC     CX
PUSH    BX
AND     [SI+49],DL
DEC     BP
INC     BP
CS:
AND     [BX+DI+4F],BL
PUSH    BP
AND     [DI+41],CL
POP     CX
SUB     AL,22
ADD     AH,CH
DEC     DI
DB      62
SBB     DX,[BX+DI+4822]
DEC     DI
PUSH    DI
INC     BP
PUSH    SI
INC     BP
PUSH    DX
SUB     AL,20
INC     SP
INC     BP
PUSH    SI
INC     BP
DEC     SP
DEC     DI
PUSH    AX
AND     [BP+SI+59],AL
AND     [BX+DI+4E],CL
INC     SI
DEC     CX
DEC     SP
DEC     SP
DEC     CX
DEC     SI
INC     DI
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+4F],AL
DEC     SP
DEC     DI
PUSH    DX
INC     BP
INC     SP
AND     [BX+DI+52],AL
INC     BP
INC     CX
CS:
AND     [SI+48],DL
DEC     CX
PUSH    BX
AND     [BX+49],DL
DEC     SP
DEC     SP
AND     [BX+SI+45],CL
DEC     SP
PUSH    AX
AND     [SI+4F],CL
PUSH    DI
INC     BP
PUSH    DX
AND     [BP+SI],AH
ADD     [DI],AL
PUSH    AX
DB      6C
SBB     DX,[BX+DI+5422]
DEC     AX
INC     BP
AND     [BP+41],DL
INC     BX
INC     CX
DEC     SI
INC     BX
POP     CX
AND     [BP+SI+41],DL
PUSH    SP
INC     BP
CS:
AND     AL,[BX+SI]
POP     CS
PUSH    AX
JBE     3ED7
XCHG    CX,AX
CMP     DL,[BX+DI+913A]
ADD     [8050],DH
SBB     DX,[BX+DI+CE20]
POP     CS
SBB     BP,[BX+DI]
CMP     SP,[BP+SI]
PUSH    AX
PUSH    DX
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [SI+4F],DL
AND     [BP+DI+4F],AL
DEC     SI
PUSH    SP
DEC     CX
DEC     SI
PUSH    BP
INC     BP
AND     AL,[BX+SI]
AAS
PUSH    AX
MOV     BL,[BP+DI]
INC     CX
AND     AL,E7
FIADD   WORD PTR [BX+SI]
PUSH    BP
PUSH    AX
POP     [BP+DI]
MOV     SP,[BX+SI]
INC     CX
AND     AL,20
OUT     20,AX
AND     AH,[BP+SI]
AND     CH,CL
AND     [BX+DI+0E20],CL
MOV     BL,[BP+DI]
ADD     [BP+DI+50],BL
XCHG    SP,AX
SBB     CX,[BP+6100]
PUSH    AX
MOV     SP,8E1B
ADD     [DI+C150],CL
SBB     DI,[BP+SI]
POP     CX
DB      6D
DB      6F
DB      6E
DB      65
JNS     3F41
JZ      3F92
AND     [SI+61],CH
DB      6E
DB      64
DB      6F
JA      3F99
DB      65
JB      3F4E
DB      69
DB      66
AND     [BP+DI+6F],AH
DB      6C
DB      6F
JB      3F57
DB      69
JNB     3F5A
DB      62
DB      6C
DB      61
DB      63
DB      6B
ADD     AL,AL
PUSH    AX
MOV     BYTE PTR [BP+DI],8B
AND     [SI+24],DL
SUB     [BP+SI+4F],DL
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     E729:400F
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
AND     CH,CL
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
```

```
SUB     [E729],DL
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [2029],DL
JMP     4981
ADD     DH,AL
PUSH    AX
RCR     BYTE PTR [BP+DI],1
MOV     ES,[BX+SI]
OUT     50,AX
SUB     BL,[SI]
CMP     CL,[BX+43D9]
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     [BX+41],DL
PUSH    BX
AND     [BX+SI+45],CL
INC     CX
PUSH    SI
POP     CX
AND     [BX+DI+4E],CL
INC     SP
PUSH    BP
PUSH    BX
PUSH    SP
PUSH    DX
POP     CX
ADD     [DI],BL
PUSH    CX
XOR     AL,1C
MOV     SP,[BX+SI]
PUSH    AX
INC     CX
PUSH    DX
DEC     BX
OUT     12,AX
AND     CH,CL
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     BH,AH
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     CL,CH
AND     [BX],CL
OR      BH,[BP+SI]
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+SI],BL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+SI],BL
SUB     DX,BP
ADC     AX,[BX+SI]
CS:
PUSH    CX
DS:
SBB     AL,82
AND     [BX+DI+20],CL
OUT     20,AX
ADC     AH,[BX+SI]
INT     3
AND     [BX],CL
OR      AL,[BX+SI]
PUSH    BX
PUSH    CX
DEC     AX
SBB     AL,57
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
OUT     57,AX
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
JMP     911F
DEC     SP
SUB     [EA29],DL
ADC     BP,[BX+DI]
JMP     2A29
ADC     CH,[BX+DI]
JMP     4018
JNB     4059
PUSH    DX
SBB     AL,8B
AND     [BX+DI+20],CL
OUT     20,AX
SBB     [BX+SI],SP
INT     20
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI],BL
SUB     DI,SP
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI],BL
SUB     CX,BP
ADC     AL,[BX+SI]
JPO     4079
POP     SP
SBB     AL,83
AND     [BX+DI+00],CL
XCHG    SP,AX
PUSH    CX
DB      66
SBB     AL,4D
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+SI],BL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+SI],BL
SUB     CX,BP
POP     CS
OR      AL,[BX+SI]
SAHF
PUSH    CX
DB      6B
SBB     AL,8D
AND     [1BC6],CL
ADD     [BX+6D51],DH
SBB     AL,54
AND     AL,28
PUSH    DX
DEC     DI
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     E729:400F
PUSH    AX
AND     AL,28
PUSH    SS
SUB     [BX+SI],AX
RCL     WORD PTR [BX+DI+70],1
SBB     AL,3A
POP     CX
INC     SP
INC     BP
PUSH    SP
INC     BP
PUSH    DX
DEC     BP
DEC     CX
DEC     SI
INC     BP
AND     [SI+55],AL
DEC     BP
PUSH    AX
PUSH    BX
DEC     CX
PUSH    SP
INC     BP
ADD     BL,BL
PUSH    CX
JPE     40A4
LEA     SP,[BX+SI]
PUSH    CS
REPNZ
SBB     AL,00
CMC
PUSH    CX
CBW
SBB     AL,3A
POP     CX
DEC     CX
DEC     SI
INC     SI
PUSH    DX
INC     CX
PUSH    BX
PUSH    SP
PUSH    DX
PUSH    BP
INC     BX
PUSH    SP
PUSH    BP
PUSH    DX
INC     BP
AND     [SI+41],DL
POP     AX
ADD     [BX+DI],AH
PUSH    DX
MOV     [8B1C],AL
AND     [BX+DI+4D],CL
PUSH    AX
INC     BX
PUSH    SP
AND     BH,AH
AND     [BP+SI],DL
AND     CH,CL
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX+SI],BL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+SI],BL
SUB     DX,BP
PUSH    SS
CMP     CL,[BX+DI+0E20]
```

```
RETF    001C
XOR     DL,[BP+SI-54]
SBB     AL,82
AND     [BX+DI+20],CL
OUT     20,AX
ADC     AH,[BX+SI]
INT     3
AND     [BX],CL
OR      AL,[BX+SI]
DEC     DX
PUSH    DX
MOV     DH,1C
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
OUT     4D,AX
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
JMP     5252:0016
DB      C0
SBB     AL,83
AND     [BX+DI+00],CL
DB      64
PUSH    DX
RETF    3A1C
POP     CX
INC     SP
PUSH    DX
INC     CX
PUSH    DI
AND     [SI+41],DL
INC     DX
DEC     SP
INC     BP
ADD     [BP+52],CH
AAM     1C
LEA     SP,[BX+SI]
PUSH    CS
IN      AL,DX
PUSH    CS
ADD     [BX+SI+52],BH
FICOMP  WORD PTR [SI]
LEA     SP,[BX+SI]
PUSH    CS
ADC     [BX],AH
ADD     [BP+52],BH
CALL    CF4C
ADD     [BP+F252],CL
SBB     AL,3A
POP     CX
INC     SP
PUSH    BP
DEC     BP
PUSH    AX
PUSH    BX
DEC     CX
PUSH    SP
INC     BP
ADD     [SI+FC52],DL
SBB     AL,C0
ADD     [BP+SI+0652],BL
SBB     AX,0091
OUT     52,AL
ADC     [DI],BL
XCHG    CX,AX
AND     CL,[BX+DI+6E]
DB      64
JNZ     41CB
JZ      41CC
DB      69
DB      65
JNB     417E
DB      6D
JNZ     41D4
JZ      4183
DB      64
DB      69
JNB     41D7
DB      6F
JNB     41CF
AND     [BX+66],CH
AND     [SI+68],DH
DB      65
DB      69
JB      4194
JA      41D7
JNB     41EC
DB      65
AND     [BP+SI+79],AH
JO      41F0
DB      6F
DB      64
JNZ     41E5
JZ      41F7
CS:
AND     [BP+DI+69],DL
DB      6E
DB      63
DB      65
AND     [BX+DI+6E],AH
AND     [BX+DI+6E],CH
DB      64
JNZ     4207
JZ      4208
JNS     41BA
ADD     [BX+SI],DH
PUSH    BX
SBB     BL,[DI]
XCHG    CX,AX
AND     CH,[BX+SI+61]
JNB     41C3
DB      62
DB      65
DB      65
DB      6E
AND     [SI+6F],CH
DB      63
DB      61
JZ      4213
DB      64
SUB     AL,20
JNS     4222
JNZ     41D5
DB      6D
JNZ     422B
JZ      41DA
DB      6E
DB      6F
JA      41DE
DB      63
DB      68
DB      6F
DB      6F
JNB     4229
AND     [BX+DI+20],AH
DB      64
JNZ     4237
JO      423F
DB      69
JZ      4234
AND     [BP+6F],AH
JB      41F4
JZ      423E
DB      65
JNB     423E
AND     [BX+61],DH
JNB     4252
DB      65
JNB     420F
AND     AL,[BX+SI]
CMP     [BP+DI+24],DL
SBB     AX,3A91
XCHG    CX,AX
ADD     [BP+DI+2E53],AL
SBB     AX,2291
INC     SP
DB      69
JNB     4258
JNZ     426A
JNB     4219
DB      6E
DB      6F
JA      421D
JZ      4267
DB      65
AND     [SI+6F],CH
DB      63
DB      61
JZ      4270
DB      6F
DB      6E
AND     [BP+6F],AH
JB      422E
JZ      4278
DB      65
AND     [SI+75],AH
DB      6D
JO      428A
DB      69
JZ      427F
AND     [BX+DI+6E],AH
DB      64
AND     [BP+6F],DH
JZ      4288
AND     [BX+6E],CH
AND     [SI+68],DH
DB      65
AND     [SI+6F],CH
DB      63
DB      61
JZ      429A
DB      6F
DB      6E
CS:
AND     AL,[BX+SI]
LEA     DX,[BP+DI+38]
SBB     AX,3A91
XCHG    CX,AX
CMP     DL,[BX+DI+B400]
PUSH    BX
CMP     BL,[DI]
XCHG    CX,AX
AND     DH,CL
POP     CS
PUSH    DS
SUB     [BP+DI],DI
AND     [BP+SI],AH
PUSH    AX
PUSH    DX
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [SI+4F],DL
AND     [BP+DI+45],DL
INC     BP
AND     [DI+41],CL
PUSH    AX
AND     AL,[BX+SI]
MOV     BP,3C53
SBB     AX,2441
OUT     DE,AX
ADD     BH,CL
PUSH    BX
DS:
```

```
SBB     AX,208B
INC     CX
AND     AL,E7
AND     AH,[BP+SI]
AND     CH,CL
AND     [1D3C],CL
ADD     CL,BL
PUSH    BX
INC     AX
SBB     AX,208D
PUSH    CS
ADC     [BX],AH
ADD     BL,BH
PUSH    BX
INC     DX
SBB     AX,CE91
POP     CS
PUSH    DS
SUB     [BP+DI],DI
AND     DL,[BX+SI+52]
INC     BP
PUSH    BX
PUSH    BX
AND     [BX+DI+4E],AL
POP     CX
AND     [BP+DI+45],CL
POP     CX
AND     [SI+4F],DL
AND     [BP+4F],DL
PUSH    SP
INC     BP
AND     AL,[BX+SI]
PUSH    DS
PUSH    SP
INC     DI
SBB     AX,2091
INTO
POP     CS
PUSH    DS
SUB     [BP+DI],DI
AND     AL,[BP+4F]
PUSH    DX
AND     [SI+55],AL
DEC     BP
PUSH    AX
PUSH    BX
DEC     CX
PUSH    SP
INC     BP
AND     [SI+4F],CL
INC     BX
INC     CX
PUSH    SP
DEC     CX
DEC     DI
DEC     SI
AND     AL,[BX+SI]
DAA
PUSH    SP
DEC     SP
SBB     AX,2441
OUT     DE,AX
ADD     [BX+DI],BH
PUSH    SP
PUSH    SI
SBB     AX,208B
INC     CX
AND     AL,E7
AND     AH,[BP+SI]
AND     CH,CL
AND     [1D4C],CL
ADD     [BP+DI+54],AL
DB      60
SBB     AX,208D
PUSH    CS
SUB     AL,15
ADD     [BP+54],DL
DB      65
SBB     AX,208B
PUSH    BX
PUSH    DI
OUT     11,AX
AND     CH,CL
AND     [BX+DI+0E20],CL
REPNZ
SBB     AL,00
POP     SP
PUSH    SP
DB      6A
SBB     AX,00C0
TEST    AL,54
JZ      4330
XCHG    CX,AX
AND     CL,[BX+DI+4E]
INC     SP
DEC     CX
INC     BX
INC     CX
PUSH    SP
INC     BP
AND     [SI+48],DL
INC     BP
AND     [BP+DI+45],DL
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     [BX+46],CL
AND     [SI+48],DL
INC     BP
AND     [BP+DI+49],AL
PUSH    SP
POP     CX
AND     [BP+4F],AL
PUSH    DX
AND     [SI+48],DL
INC     BP
AND     [SI+55],AL
DEC     BP
PUSH    AX
PUSH    BX
DEC     CX
PUSH    SP
INC     BP
AND     [BP+SI+59],AL
AND     [SI+45],CL
PUSH    SP
PUSH    SP
INC     BP
PUSH    DX
AND     [4E20],AH
PUSH    BP
DEC     BP
INC     DX
INC     BP
PUSH    DX
PUSH    BX
AND     AL,[BX+SI]
MOV     DH,54
JLE     437C
TEST    [BX+SI],SP
PUSH    BX
INC     BP
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     AL,00
SBB     DX,[DI-78]
SBB     AX,208B
CALL    [BP+SI+5328]
INC     BP
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     AL,29
AND     AL,CH
OUT     14,AL
AND     CH,CL
AND     [BX+DI+5422],DL
POP     CX
PUSH    AX
INC     BP
AND     [BX+DI+4E],CL
AND     [BP+DI+45],DL
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     [BX+DI+47],AL
INC     CX
DEC     CX
DEC     SI
CS:
AND     [BP+SI+45],DL
DEC     BP
INC     BP
DEC     BP
INC     DX
INC     BP
PUSH    DX
AND     [SI+59],DL
PUSH    AX
INC     BP
AND     [BX+DI+20],AL
DEC     SP
INC     BP
PUSH    SP
PUSH    SP
INC     BP
PUSH    DX
AND     [BP+4F],AL
DEC     SP
DEC     SP
DEC     DI
PUSH    DI
INC     BP
INC     SP
AND     [BP+SI+59],AL
AND     [BP+SI],DH
AND     [BP+55],CL
DEC     BP
INC     DX
INC     BP
PUSH    DX
PUSH    BX
AND     BH,[BP+SI]
AND     [BX+DI+0E20],CL
JZ      43EA
ADD     [9255],DH
SBB     AX,4F43
DEC     SP
OUT     20,AX
CALL    [DI+FF28]
SUB     WORD PTR [BX+SI],4553
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     AL,2C
ADC     CH,[BX+DI]
SUB     [BX+SI],AX
PUSH    DX
PUSH    BP
PUSHF
SBB     AX,208B
INC     BX
DEC     DI
DEC     SP
AND     DH,AH
AND     [BX],CL
DEC     SI
AND     CH,CL
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AND     [BP+DI-4F],AL
DEC     SP
OUT     43,AX
DEC     DI
DEC     SP
JMP     C000:200F
PUSH    BP
CMPSB
SBB     AX,208B
INC     BX
DEC     DI
DEC     SP
AND     AL,CH
AND     [BX],CL
INC     CX
AND     BH,CH
AND     [BP+DI+4F],AL
DEC     SP
AND     DH,AH
AND     [BX],CL
DEC     SI
AND     CH,CL
AND     [BX+DI+2220],DL
PUSH    DI
PUSH    DX
DEC     DI
DEC     SI
INC     DI
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
CS:
AND     [SI+52],DL
POP     CX
AND     [BX+DI+47],AL
INC     CX
DEC     CX
DEC     SI
CS:
AND     [BP+SI+45],DL
DEC     BP
INC     BP
DEC     BP
INC     DX
INC     BP
PUSH    DX
AND     [SI+45],CL
PUSH    SP
PUSH    SP
INC     BP
PUSH    DX
AND     [BX+46],CL
AND     [BP+DI+49],AL
PUSH    SP
POP     CX
AND     [BP+DI+45],DL
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     [DI+55],CL
PUSH    BX
PUSH    SP
AND     [BP+DI+4F],AL
DEC     BP
INC     BP
AND     [BP+49],AL
PUSH    DX
PUSH    BX
PUSH    SP
AND     BH,[BP+SI]
MOV     [BX+SI],SP
PUSH    CS
JZ      448F
ADD     DH,BL
PUSH    BP
MOV     AL,1D
PUSH    DX
DEC     DI
PUSH    DI
AND     BH,AH
AND     BH,BH
XCHG    SP,AX
SUB     BH,BH
SUB     WORD PTR [BX+SI],+53
INC     BP
INC     BX
PUSH    SP
DEC     DI
PUSH    DX
AND     AL,2C
ADC     BP,[SI]
ADC     BP,[BX+DI]
SUB     [BX+SI],AX
CMP     [BP-46],DX
SBB     AX,208B
PUSH    DX
DEC     DI
PUSH    DI
AND     AL,CH
AND     [BP+SI],DL
AND     BH,CH
AND     [BP+SI+4F],DL
PUSH    DI
AND     DH,AH
AND     [BX],CL
OR      SP,[BX+SI]
INT     20
XCHG    CX,AX
AND     DL,[BX+52]
DEC     DI
DEC     SI
INC     DI
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
CS:
AND     [SI+52],DL
POP     CX
AND     [BX+DI+47],AL
INC     CX
DEC     CX
DEC     SI
CS:
AND     [BP+DI+48],AL
DEC     DI
DEC     DI
PUSH    BX
INC     BP
AND     [BX+DI+20],AL
PUSH    DX
DEC     DI
PUSH    DI
AND     [BP+SI+45],AL
PUSH    SP
PUSH    DI
INC     BP
INC     BP
DEC     SI
AND     [BX+DI],DH
AND     [BX+DI+4E],AL
INC     SP
AND     [BX+DI],DH
XOR     [BP+SI],SP
CMP     CL,[BX+DI+0E20]
JZ      4508
ADD     [BP+DI+56],AL
MOV     DI,8D1D
AND     [1BC6],CL
ADD     [SI+56],AH
LES     BX,[DI]
CMP     CL,[BX+53D9]
POP     CX
DEC     BP
INC     DX
DEC     DI
DEC     SP
AND     [BP+4F],AL
PUSH    DX
AND     [SI+55],AL
DEC     BP
PUSH    AX
AND     [BX+DI+4E],CL
AND     [DI+45],CL
DEC     BP
DEC     DI
PUSH    DX
POP     CX
ADD     [DI+56],BH
INTO
SBB     AX,2454
SUB     [BP+SI+4F],DL
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     E729:400F
PUSH    AX
AND     AL,28
SBB     CH,[BX+DI]
ADD     [BP+DI+D856],AL
SBB     AX,008E
MOVSB
PUSH    SI
PUSH    DS
PUSH    DS
CMP     CL,[BX+73D9]
DB      69
DB      6E
DB      67
DB      6C
DB      65
AND     [BP+61],AH
DB      6D
DB      69
DB      6C
JNS     456B
JB      45B2
JNB     45B8
DB      64
DB      65
DB      6E
JZ      45B5
DB      69
DB      6C
ADD     [BX+2856],CH
PUSH    DS
LEA     SP,[BX+SI]
PUSH    CS
CALL    FAR [BP+SI]
CMP     AX,[BX+SI]
LDS     DX,[BP+32]
PUSH    DS
MOV     SP,[BX+SI]
DEC     SI
DEC     DI
INC     SP
INC     BP
PUSH    SI
OUT     12,AX
AND     CH,CL
AND     [BX+DI+0E20],CL
ADD     AL,1F
ADD     DL,BH
PUSH    SI
CMP     AL,1E
MOV     SP,[BX+SI]
PUSH    AX
INC     CX
PUSH    DX
```

```
DEC     BX
OUT     12,AX
AND     CH,CL
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     BH,AH
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     CL,CH
POP     CS
OR      BH,[BP+SI]
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DX,BP
ADC     AX,[BX+SI]
SUB     AX,4657
PUSH    DS
CMP     CL,[BX+69D9]
DB      66
AND     [SI+61],CH
DB      6E
DB      64
AND     [BX+77],CH
DB      6E
DB      65
JB      45E2
DB      67
DB      65
JZ      4639
AND     [SI],AH
AND     [BP+DI+61],AH
JNZ     4640
DB      65
AND     [SI+65],AH
JBE     4638
DB      6C
DB      6F
JO      4640
DB      6E
DB      67
AND     [BP+SI+6C],AH
DB      61
DB      63
DB      6B
ADD     [BX],DH
PUSH    DI
PUSH    AX
PUSH    DS
LEA     SP,[BX+SI]
PUSH    CS
DB      C1
SBB     AX,[BX+SI]
PUSH    AX
PUSH    DI
POP     DX
PUSH    DS
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DX,BP
PUSH    SS
ADD     [BP+DI+6457],AL
PUSH    DS
CMP     CL,[BX+77D9]
DB      65
DB      6C
DB      66
DB      61
JB      469A
ADD     [BP+SI+6E57],DL
PUSH    DS
AND     BYTE PTR [BX+SI],49
OUT     12,AX
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
MOV     AL,57
JS      4667
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
OUT     57,AX
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
JMP     9783
DEC     SP
SUB     [BP+SI],DL
SUB     DX,BP
ADC     BP,[BX+DI]
ADD     [BX+SI+8257],BH
PUSH    DS
AND     WORD PTR [BX+SI],+49
ADD     BH,BL
PUSH    DI
MOV     [8F3A],DS
FLDENV  [BP+DI+68]
DB      65
DB      63
DB      6B
AND     [BP+63],DH
AND     [SI+6F],DH
AND     [BP+DI+65],DH
DB      65
AND     [BX+DI+66],CH
AND     [BX+65],DH
DB      6C
DB      66
DB      61
JB      46F1
AND     [SI+6F],AH
JA      46FF
ADD     [BP+SI],DL
POP     AX
WAIT
PUSH    DS
MOV     SP,[BX+SI]
PUSH    SP
AND     AL,28
PUSH    DX
DEC     DI
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     2029:400F
CALL    6790
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
AND     CH,CL
AND     [BP+43],DL
OUT     56,AX
INC     BX
JMP     66CC
CMP     AH,[BX+DI+5620]
INC     BX
OUT     56,AX
INC     BX
JMP     46D8
DAA
POP     AX
MOV     AL,[8B1E]
AND     [BP+43],DL
AND     AL,CH
AND     [CD20],DL
AND     [BX+DI+0E20],CL
DB      C8
PUSH    DS
ADD     [AA58],DH
PUSH    DS
AND     BYTE PTR [BX+SI],49
OUT     12,AX
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
DEC     SP
POP     AX
MOV     AH,1E
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
OUT     57,AX
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
JMP     5854:0012
MOV     SI,831E
AND     [BX+DI+00],CL
JPE     4761
DB      C8
PUSH    DS
CMP     CL,[BX+6ED9]
DB      65
JA      4732
JZ      477D
DB      6E
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JZ      4737
DB      6F
DB      6E
DB      6D
DB      61
JO      473D
JO      4794
JZ      4741
DB      69
DB      6E
JZ      4794
AND     [DI+65],CH
DB      6D
DB      6F
JB      47A5
ADD     [DI+D258],DL
PUSH    DS
PUSH    SP
AND     AL,28
PUSH    DX
DEC     DI
PUSH    DI
SUB     AL,20
INC     BX
DEC     DI
DEC     SP
JMP     E729:400F
AND     [BX+SI+24],DL
SUB     [BP+SI],DL
SUB     [BX+SI],AX
SCASB
POP     AX
FCOMP   QWORD PTR [8F3A]
FLDENV  [SI+69]
JNB     47C3
DB      6C
DB      61
JNS     4777
DB      6E
DB      65
JA      477B
JZ      47BE
DB      62
DB      6C
DB      65
ADD     [BX+SI+E658],BH
PUSH    DS
LEA     SP,[BX+SI]
PUSH    CS
IN      AL,DX
PUSH    CS
ADD     BH,CL
POP     AX
LOCK
PUSH    DS
CMP     CL,[BX+64D9]
DB      69
JNB     47E6
DB      6C
DB      61
JNS     479A
DB      6E
DB      65
JA      479E
DB      6D
DB      61
JO      4782
FSTP    DWORD PTR [BX+SI-06]
PUSH    DS
LEA     SP,[BX+SI]
PUSH    CS
ADC     [BX],AH
ADD     BH,BL
POP     AX
ADD     AL,1F
MOV     ES,[BX+SI]
IN      AX,DX
POP     AX
INC     AX
POP     DS
INC     SI
DEC     DI
PUSH    DX
DEC     BP
INC     CX
PUSH    SP
AND     [BP+DI+3A],AL
ADD     [DI],CL
POP     CX
DEC     DX
POP     DS
CMP     CL,[BX+6DD9]
JNZ     4816
JZ      4815
JO      481A
DB      65
AND     [BP+61],AH
DB      6D
DB      69
DB      6C
JNS     47D7
DB      64
JA      481F
DB      6C
DB      6C
DB      69
DB      6E
DB      67
ADD     [BX],DL
POP     CX
DEC     DI
POP     DS
LEA     SP,[BX+SI]
PUSH    CS
CALL    FAR [BP+SI]
ADD     [BX],CH
POP     CX
PUSH    SP
POP     DS
MOV     SP,[BX+SI]
DEC     SI
DEC     DI
INC     SP
INC     BP
PUSH    SI
AND     BH,AH
AND     [BP+SI],DL
AND     CH,CL
AND     [BX+DI+0E20],CL
CALL    FAR [BX]
ADD     [BX+DI],BH
POP     CX
POP     CX
POP     DS
LEA     SP,[BX+SI]
PUSH    CS
MOV     BYTE PTR [BP+DI],00
JNO     4847
POP     SI
POP     DS
MOV     SP,[BX+SI]
PUSH    AX
INC     CX
PUSH    DX
DEC     BX
AND     BH,AH
AND     [BP+SI],DL
AND     CH,CL
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     BH,AH
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     CL,CH
AND     [BX],CL
OR      BH,[BP+SI]
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DX,BP
ADC     AX,[BX+SI]
MOV     BL,[BX+DI+63]
POP     DS
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     CX,BP
POP     CS
OR      AL,[BX+SI]
MOV     AL,59
DB      68
POP     DS
MOV     SP,[BX+SI]
DEC     CX
DEC     BP
PUSH    AX
INC     BX
PUSH    SP
AND     BH,AH
AND     [BP+SI],DL
AND     CH,CL
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DX,BP
PUSH    SS
ADD     CH,AL
POP     CX
JB      4886
CMP     CL,[BX+20D9]
JNO     48E2
DB      61
DB      6C
AND     [BX+66],CH
AND     [SI+69],CH
DB      66
DB      65
ADD     DH,DL
POP     CX
JL      489B
AND     BYTE PTR [BX+SI],49
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```
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
NEG     BYTE PTR [BX+DI-7A]
POP     DS
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
OUT     57,AX
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     CL,CH
AND     [BX+SI],CH
PUSH    CX
DEC     SP
SUB     [BP+DI],DL
SUB     DX,BP
ADC     BP,[BX+DI]
ADD     DH,BH
POP     CX
NOP
POP     DS
AND     WORD PTR [BX+SI],+49
ADD     [9A5A],CL
POP     DS
CMP     CL,[BX+63D9]
DB      68
DB      65
DB      63
DB      6B
AND     [BP+63],DH
ADD     [BP+DI+5A],AL
MOVSB
POP     DS
MOV     SP,[BX+SI]
PUSH    SP
AND     AL,28
PUSH    DX
DEC     DI
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     E829:400F
OUT     50,AL
AND     AL,28
SBB     [BX+DI],BP
AND     CH,CL
AND     [BP+43],DL
OUT     56,AX
INC     BX
JMP     68F9
CMP     AH,[BX+DI+5620]
INC     BX
AND     BH,AH
AND     [BP+43],DL
AND     CL,CH
AND     [BP+DI],DL
ADD     [BP+5A],DL
SCASB
POP     DS
MOV     SP,[BX+SI]
PUSH    SI
INC     BX
CALL    6917
INT     20
MOV     [BX+SI],SP
PUSH    CS
DB      D6
POP     DS
ADD     [BX+5A],AH
MOV     AX,821F
AND     [BX+DI+20],CL
OUT     20,AX
ADC     AH,[BX+SI]
INT     3
AND     [BX],CL
OR      AL,[BX+SI]
JG      4976
RET     571F
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
OUT     20,AX
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     DL,CH
ADC     AL,[BX+SI]
XCHG    [BP+SI-34],BX
POP     DS
AND     WORD PTR [BX+SI],+49
ADD     [BX+DI+D65A],BL
POP     DS
CMP     CL,[BX+64D9]
JB      49A5
JA      4966
JZ      49A9
DB      62
DB      6C
DB      65
ADD     [BP+DI+E05A],AH
POP     DS
LEA     SP,[BX+SI]
PUSH    CS
IN      AL,DX
PUSH    CS
ADD     [BP+DI+EA5A],DH
POP     DS
CMP     CL,[BX+64D9]
JB      49C1
JA      4982
DB      6D
DB      61
JO      4966
INT     3
POP     DX
OUT     DX,AX
POP     DS
PUSH    SP
AND     AL,28
PUSH    DX
DEC     DI
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     E729:400F
PUSH    AX
AND     AL,28
ADC     BP,[BX+DI]
ADD     DH,DL
POP     DX
HLT
POP     DS
LEA     SP,[BX+SI]
PUSH    CS
ADC     [BX],AH
ADD     AH,BL
POP     DX
CALL    FAR [BX]
MOV     ES,[BX+SI]
REPNZ
POP     DX
JBE     49B3
CMP     CL,[BX+73D9]
DB      6D
DB      61
DB      6C
DB      6C
AND     [BP+SI+75],AH
JNB     4A09
DB      6E
DB      65
JNB     4A17
ADD     [BP+SI],BH
POP     BX
AND     BYTE PTR [BX+SI],8B
AND     [BX+SI+41],DL
PUSH    DX
DEC     BX
OUT     12,AX
AND     CH,CL
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
OUT     50,AX
INC     SI
PUSH    BP
DEC     SI
INC     SP
AND     CL,CH
POP     CS
OR      BH,[BP+SI]
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DX,BP
ADC     DI,[BP+SI]
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX],DL
SUB     DX,BP
ADC     AX,[BX+SI]
POP     SI
POP     BX
TEST    [BX+SI],SP
MOV     SP,[BX+SI]
DEC     CX
DEC     BP
PUSH    AX
INC     BX
PUSH    SP
OUT     12,AX
AND     CH,CL
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
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```
POP     CX
SUB     [SI],DL
SUB     DX,BP
ADC     AL,00
DB      68
POP     BX
MOV     AH,[BX+SI]
LEA     SP,[BX+SI]
PUSH    CS
MOV     BYTE PTR [BP+DI],00
SBB     BYTE PTR [BP+DI-6C],20
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     CX,BP
PUSH    SS
ADD     [BX+DI+9E5B],BL
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX],DL
SUB     CX,BP
POP     CS
OR      AL,[BX+SI]
TEST    AL,5B
TEST    AL,20
AND     BYTE PTR [BX+SI],49
OUT     12,AX
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
MOV     WORD PTR [BP+DI-4E],5720
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
OUT     57,AX
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     CL,CH
SUB     [BX+DI+4C],DL
SUB     [SI],DL
SUB     DX,BP
ADC     BP,[BX+DI]
ADD     BH,CL
POP     BX
MOV     SP,8320
AND     [BX+DI+00],CL
IN      AX,5B
MOV     BYTE PTR [BX+SI],3A
POP     CX
DB      64
JB      4AED
JA      4AAE
DB      6E
DB      65
JA      4AB2
JZ      4AF5
DB      62
DB      6C
DB      65
ADD     BH,CH
POP     BX
SHL     BYTE PTR [BX+SI],1
LEA     SP,[BX+SI]
PUSH    CS
IN      AL,DX
PUSH    CS
ADD     [BX+SI],AL
POP     SP
FISUB   DWORD PTR [BX+SI]
CMP     CL,[BX+20D9]
DB      64
JB      4B0E
JA      4ACF
DB      6D
DB      61
JO      4AB3
SBB     [SI-21],BX
AND     [SI+24],DL
SUB     [BP+SI+4F],DL
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     E729:400F
PUSH    AX
AND     AL,28
ADC     AL,29
ADD     [BP+DI],AH
POP     SP
IN      AL,20
LEA     SP,[BX+SI]
PUSH    CS
ADC     [BX],AH
ADD     [BX+DI],CH
POP     SP
OUT     DX,AL
AND     [BP+4700],CL
POP     SP
DS:
AND     [BP+SI],DI
POP     CX
DB      63
DB      68
DB      6F
DB      69
DB      63
AND     [BX+61],DH
JNB     4B0D
DB      62
DB      69
DB      67
AND     [BP+SI+75],AH
JNB     4B5E
DB      6E
DB      65
JNB     4B6C
ADD     [BX+485C],DL
AND     [BP+DI+5020],CX
INC     CX
PUSH    DX
DEC     BX
AND     BH,AH
AND     [BP+SI],DL
AND     CH,CL
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     BH,AH
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     CL,CH
AND     [BX],CL
OR      BH,[BP+SI]
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     [BX+SI],SP
OUT     20,AX
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DX,BP
ADC     DI,[BP+SI]
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+SI],BL
SUB     [BX+SI],SP
OUT     20,AX
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+SI],BL
SUB     DX,BP
ADC     AX,[BX+SI]
MOV     AX,[5C5C]
AND     [DI+0E20],CX
MOV     BYTE PTR [BP+DI],00
MOV     DX,665C
AND     [DI+4F],CX
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     CX,BP
POP     CS
OR      AL,[BX+SI]
RCR     WORD PTR [SI+70],CL
AND     [DI+4F],CX
DEC     SI
INC     BP
POP     CX
SUB     [BX+SI],BL
SUB     DI,SP
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+SI],BL
SUB     CX,BP
POP     CS
OR      AL,[BX+SI]
ADD     BL,[DI+7A]
AND     [BP+SI],DI
POP     CX
DEC     BP
DEC     DI
PUSH    DX
INC     BP
AND     [BP+SI+4F],CL
INC     DX
```

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PUSH    BX
AND     [BX+DI+4E],AL
INC     SP
AND     [BX+DI+4C],DL
AND     [DI+4E],AL
PUSH    SI
DEC     CX
PUSH    DX
DEC     DI
DEC     SI
DEC     BP
INC     BP
DEC     SI
PUSH    SP
INC     CX
DEC     SP
AND     [BP+DI+4F],AL
DEC     SI
INC     BX
INC     BP
PUSH    DX
DEC     SI
PUSH    BX
ADD     [BP+DI],DL
POP     BP
TEST    [BX+DI],AH
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
XOR     AX,8E5D
AND     [BX+45],DX
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
OUT     57,AX
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     CL,CH
AND     [BX+SI],CH
PUSH    CX
DEC     SP
SUB     [DI],DL
SUB     DX,BP
ADC     BP,[BX+DI]
JMP     4BFA
CMP     AX,985D
AND     [BP+DI+4920],AX
ADD     [BX+5D],DL
MOV     [3A21],AL
POP     CX
DEC     CX
DEC     SI
INC     SI
PUSH    DX
INC     CX
PUSH    BX
PUSH    SP
PUSH    DX
PUSH    BP
INC     BX
PUSH    SP
PUSH    BP
PUSH    DX
INC     BP
AND     [SI+41],DL
POP     AX
ADD     [BX+SI+A75D],CL
AND     [BP+DI+4920],CX
DEC     BP
PUSH    AX
INC     BX
PUSH    SP
AND     BH,AH
AND     [BP+SI],DL
AND     CH,CL
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     [BX+SI],SP
OUT     20,AX
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [SI],DL
SUB     [BX+SI],SP
JMP     3A20:1620
MOV     [BX+SI],SP
PUSH    CS
RETF    0021
CWD
POP     BP
LODSB
AND     [BP+SI+4920],AX
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
MOV     AH,5D
MOV     DH,21
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     BH,AH
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     DL,CH
PUSH    SS
ADD     [SI+C05D],BH
AND     [BP+DI+4920],AX
ADD     BL,DL
POP     BP
RETF    3A21
POP     CX
PUSH    AX
PUSH    DX
DEC     CX
DEC     SI
PUSH    SP
AND     [BP+45],CL
PUSH    DI
AND     [SI+41],DL
INC     DX
DEC     SP
INC     BP
ADD     CH,BL
POP     BP
AAM     21
LEA     SP,[BX+SI]
PUSH    CS
IN      AL,DX
PUSH    CS
ADD     DL,DH
POP     BP
FISUB   WORD PTR [BX+DI]
CMP     CL,[BX+50D9]
PUSH    DX
DEC     CX
DEC     SI
PUSH    SP
AND     [BP+45],CL
PUSH    DI
AND     [DI+41],CL
PUSH    AX
ADD     [BP+DI],CL
POP     SI
CALL    A0CB
AND     AL,28
PUSH    DX
DEC     DI
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     E729:400F
PUSH    AX
AND     AL,28
ADC     AX,0029
ADC     AX,F25E
AND     [DI+0E20],CX
ADC     [BX],AH
ADD     [BP+DI],BL
POP     SI
CLD
AND     [BP+2B00],CX
POP     SI
INC     DX
AND     BH,[BP+SI]
POP     CX
PUSH    AX
INC     CX
PUSH    DX
DEC     BX
DEC     SP
INC     CX
DEC     SI
INC     SP
ADD     [DI],DH
POP     SI
DEC     SP
AND     CL,[DI+0E20]
MOV     BYTE PTR [BP+DI],00
JNZ     4D48
PUSH    SI
AND     BH,[BP+SI]
POP     CX
INC     BX
DEC     AX
INC     BP
INC     BX
DEC     BX
AND     [BX+DI+46],CL
AND     [DI+4F],CL
DEC     SI
INC     BP
POP     CX
AND     [BP+DI+41],AL
DEC     SI
AND     [BP+DI+4F],AL
DEC     BP
INC     BP
AND     [BX+55],CL
PUSH    SP
AND     [BX+46],CL
AND     [BX+SI+41],DL
PUSH    DX
DEC     BX
INC     SI
PUSH    BP
DEC     SI
INC     SP
AND     [BX+DI+4E],CL
PUSH    BX
PUSH    SP
INC     BP
INC     CX
INC     SP
AND     [BX+46],CL
AND     [SI+41],DL
```

```
POP     AX
INC     BP
PUSH    BX
ADD     [BP+DI+605E],AH
AND     CL,[BP+DI+5020]
INC     SI
PUSH    BP
DEC     SI
INC     SP
AND     DH,AH
OUT     0F,AX
PUSH    DS
AND     CH,CL
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     BH,AH
AND     [BX+SI+46],DL
PUSH    BP
DEC     SI
INC     SP
AND     DL,CH
AND     [BX],CL
PUSH    DS
AND     [BP+SI],BH
AND     [BX+DI+0E20],CL
MOV     [BP+SI],AH
ADD     [SI+6A5E],DH
AND     AL,[BP+SI+4920]
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
IRET
POP     SI
JZ      4D8D
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
OUT     20,AX
DEC     BP
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     DL,CH
AND     [D700],DL
POP     SI
JLE     4DA8
AND     WORD PTR [BX+SI],+49
ADD     AL,CH
POP     SI
MOV     [BP+SI],AH
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
OR      [BX-6E],BX
AND     DL,[BX+45]
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
OUT     20,AX
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     CL,CH
AND     [BX+SI],CH
PUSH    CX
DEC     SP
SUB     [BX],DL
SUB     DX,BP
ADC     BP,[BX+DI]
ADD     [SI],CH
POP     DI
XCHG    DI,AX
AND     CL,[BP+DI+4920]
AND     BH,AH
AND     [SI],DL
AND     CH,CL
AND     [BX+45],DL
DEC     SP
INC     SI
SUB     [SI],DL
SUB     [BX+SI],SP
OUT     20,AX
PUSH    DI
INC     BP
DEC     SP
INC     SI
SUB     [SI],DL
SUB     [BX+SI],SP
JMP     5F34:0012
PUSHF
AND     AL,[BP+DI+4920]
ADD     [DI+5F],AL
CMPSB
AND     BH,[BP+SI]
POP     CX
DEC     SI
INC     BP
PUSH    DI
AND     [SI+41],DL
INC     DX
DEC     SP
INC     BP
ADD     [BX+5F],CL
MOV     AL,22
LEA     SP,[BX+SI]
PUSH    CS
IN      AL,DX
PUSH    CS
ADD     [BP+5F],BL
MOV     DX,3A22
POP     CX
DEC     SI
INC     BP
PUSH    DI
AND     [DI+41],CL
PUSH    AX
ADD     [BX+SI+5F],BH
LES     SP,[BP+SI]
PUSH    SP
AND     AL,28
PUSH    DX
DEC     DI
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     E729:400F
AND     [BX+SI+24],DL
SUB     [BX],DL
SUB     [BX+SI],AX
SBB     BYTE PTR [BX-32],22
LEA     SP,[BX+SI]
PUSH    CS
ADC     [BX],AH
ADD     [BX+SI+D85F],CL
AND     CL,[BP+A500]
POP     DI
MUL     BYTE PTR [BP+SI]
CMP     CL,[BX+20D9]
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     [BX+41],DL
PUSH    BX
AND     [SI+52],DL
INC     CX
DEC     SI
PUSH    BX
PUSH    AX
DEC     DI
PUSH    DX
PUSH    SP
ADD     [BX+005F],CH
AND     CX,[DI+0E20]
MOV     BYTE PTR [BP+DI],00
RET
POP     DI
OR      AH,[BP+DI]
CMP     CL,[BX+20D9]
PUSH    CX
INC     CX
DEC     SP
AND     [BX+46],CL
AND     [SI+49],CL
INC     SI
INC     BP
ADD     AH,DL
POP     DI
ADC     AL,23
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
NEG     BYTE PTR [BX+1E]
AND     DX,[BX+45]
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
OUT     57,AX
INC     BP
DEC     SP
INC     SI
SUB     [BX+DI+29],CL
AND     CL,CH
AND     [BX+SI],CH
PUSH    CX
DEC     SP
SUB     [BX+SI],BL
SUB     DX,BP
ADC     BP,[BX+DI]
JMP     4EBB
CALL    FAR [BX+28]
AND     AX,[BP+DI+4920]
ADD     [BX],DL
DB      60
XOR     AH,[BP+DI]
CMP     CL,[BX+49D9]
DEC     SI
INC     SI
INC     CX
PUSH    BX
PUSH    SP
PUSH    DX
PUSH    BP
INC     BX
PUSH    SP
PUSH    BP
PUSH    DX
INC     BP
AND     [SI+41],DL
POP     AX
ADD     [BX+SI],CH
DB      60
CMP     AL,23
AND     BYTE PTR [BX+SI],49
```

```
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AL,[BX+SI]
INC     DX
DB      60
INC     SI
AND     CX,[DI+4F]
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
OUT     4D,AX
DEC     DI
DEC     SI
INC     BP
POP     CX
SUB     [BX+DI+29],CL
AND     DL,CH
AND     [4A00],DL
DB      60
PUSH    AX
AND     AX,[BP+DI+4920]
ADD     [BP+DI+60],BL
POP     DX
AND     DI,[BP+SI]
POP     CX
DEC     SI
INC     BP
PUSH    DI
AND     [SI+41],DL
INC     DX
DEC     SP
INC     BP
ADD     [DI+60],AH
DB      64
AND     CX,[DI+0E20]
IN      AL,DX
PUSH    CS
ADD     [SI+60],DH
DB      6E
AND     DI,[BP+SI]
POP     CX
DEC     SI
INC     BP
PUSH    DI
AND     [DI+41],CL
PUSH    AX
ADD     [DI+7860],CL
AND     DX,[SI+24]
SUB     [BP+SI+4F],DL
PUSH    DI
SUB     AL,43
DEC     DI
DEC     SP
JMP     E729:400F
PUSH    AX
AND     AL,28
SBB     [BX+DI],CH
ADD     [BX+8260],DL
AND     CX,[DI+0E20]
ADC     [BX],AH
ADD     [DI+8C60],BL
AND     CX,[BP+A500]
DB      60
ADC     [BX],AH
DB      C8
AND     [BP+SI],DL
ADD     [BP+DI+1160],CH
DAA
XCHG    SP,AX
ADD     [DI+1A60],DH
DAA
MOV     DI,1120
SUB     AL,11
ADD     [DI+1F60],BH
DAA
DB      C9
AND     CH,BL
ADD     BH,AL
DB      60
AND     [BX],SP
DEC     SP
POP     CX
OUT     EA,AX
ADC     AL,[BX+SI]
SHL     BYTE PTR [BX+SI+22],1
DAA
DEC     SP
POP     AX
OUT     12,AX
ADD     BL,BL
DB      60
AND     AL,27
POP     [BX+SI]
INC     DI
PUSH    DX
DEC     CX
INC     SP
ADD     AL,DH
DB      60
CS:
DAA
AND     BYTE PTR [BX+SI],49
OUT     0F,AX
ADC     SP,[BX+SI]
INT     3
AND     [BX],CL
MOV     BX,CF20
AND     [BX],CL
OR      AL,00
ADD     AH,[BX+DI+38]
DAA
MOV     AL,28
DEC     CX
SUB     AL,18
SUB     DX,BP
SUB     [BX+DI+2C],CL
POP     CS
MOV     BH,29
ADD     [BP+SI],CL
DB      61
INC     DX
DAA
AND     WORD PTR [BX+SI],+49
ADD     [BX+SI],AH
DB      61
DEC     SP
DAA
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BX+DI],BL
AND     AH,CL
AND     [BX],CL
MOV     AX,CF20
AND     [BX],CL
ADC     [BX+SI],AL
SS:
DB      61
PUSH    SI
DAA
MOV     AL,20
SUB     [BX],CL
ADC     BP,[SI]
DEC     CX
SUB     [BX+SI],SP
JMP     BB0F:2820
SUB     AL,49
SUB     [BX+SI],AX
DS:
DB      61
DB      60
DAA
AND     WORD PTR [BX+SI],+49
ADD     [BX+SI+61],CL
DB      6A
DAA
POP     [BX+SI]
DEC     BP
INC     CX
PUSH    AX
ADD     [BP+61],BL
JZ      5026
MOV     AL,20
SUB     [BX],CL
AND     AL,2C
POP     CS
AND     CH,[BX+DI]
JMP     2C39:0F28
POP     CS
AND     CH,[BX+DI]
ADD     [BP+61],CH
JLE     503C
MOV     AL,20
JMP     390F:2820
SUB     AL,0F
OR      BP,[BX+DI]
ADD     [BP+61],BH
MOV     [BX],AH
MOV     AL,20
JMP     440F:2820
SUB     AL,0F
OR      BP,[BX+DI]
ADD     [BP+9261],CL
DAA
MOV     AL,20
JMP     530F:2820
SUB     AL,0F
POP     DS
SUB     [BX+SI],AX
SAHF
DB      61
PUSHF
DAA
MOV     AL,20
JMP     4B0F:2820
SUB     AL,0F
POP     DS
SUB     [BX+SI],AX
SCASB
DB      61
CMPSB
DAA
MOV     AL,20
JMP     4B0F:2820
SUB     AL,0F
DAS
SUB     [BX+SI],AX
MOV     SI,B061
DAA
MOV     AL,20
JMP     640F:2820
SUB     AL,0F
DAS
SUB     [BX+SI],AX
INTO
DB      61
MOV     DX,B027
AND     DL,CH
AND     [BX+SI],CH
POP     CS
DB      6B
SUB     AL,0F
CMP     BP,[BX+DI]
ADD     DH,BL
DB      61
LES     SP,[BX]
MOV     AL,20
JMP     980F:2820
SUB     AL,0F
CMP     BP,[BX+DI]
ADD     DH,CH
DB      61
```

```
INTO
DAA
MOV     AL,20
JMP     A60F:2820
SUB     AL,0F
SBB     AX,0029
JMP     [BX+DI-28]
DAA
MOV     AL,20
JMP     BA0F:2820
SUB     AL,0F
SBB     AX,0029
PUSH    CS
DB      62
LOOP    50DC
MOV     AL,20
JMP     BA0F:2820
SUB     AL,0F
PUSH    DX
SUB     [BX+SI],AX
PUSH    DS
DB      62
IN      AL,DX
DAA
MOV     AL,20
JMP     960F:2820
SUB     AL,0F
PUSH    DX
SUB     [BX+SI],AX
CS:
DB      62
MUL     BYTE PTR [BX]
MOV     AL,20
JMP     960F:2820
SUB     AL,0F
DB      63
SUB     [BX+SI],AX
DS:
DB      62
ADD     [BX+SI],CH
MOV     AL,20
JMP     A80F:2820
SUB     AL,0F
DB      63
SUB     [BX+SI],AX
DEC     SI
DB      62
OR      CH,[BX+SI]
MOV     AL,20
JMP     A80F:2820
SUB     AL,0F
JBE     5129
ADD     [BP+62],BL
POP     CS
SUB     [BX+SI+EA20],DH
AND     [BX+SI],CH
POP     CS
XCHG    SI,AX
SUB     AL,0F
JBE     5139
ADD     [BP+62],CH
ADC     AL,28
MOV     AL,20
JMP     960F:2820
SUB     AL,0F
LEA     BP,[BX+DI]
ADD     [BP+62],BH
PUSH    DS
SUB     [BX+SI+EA20],DH
AND     [BX+SI],CH
POP     CS
MOV     CH,[SI]
POP     CS
LEA     BP,[BX+DI]
ADD     [BP+2862],CL
SUB     [BX+SI+EA20],DH
AND     [BX+SI],CH
POP     CS
MOV     CH,[SI]
POP     CS
CWD
SUB     [BX+SI],AX
SAHF
DB      62
XOR     CH,[BX+SI]
MOV     AL,20
JMP     710F:2820
SUB     AL,0F
CWD
SUB     [BX+SI],AX
SCASB
DB      62
CMP     AL,28
MOV     AL,20
JMP     600F:2820
SUB     AL,0F
SCASB
SUB     [BX+SI],AX
MOV     SI,4662
SUB     [BX+SI+EA20],DH
AND     [BX+SI],CH
POP     CS
PUSH    SI
SUB     AL,0F
MOV     BP,[BX+DI]
ADD     DH,CL
DB      62
PUSH    AX
SUB     [BX+SI+EA20],DH
AND     [BX+SI],CH
POP     CS
CMP     [SI],BP
POP     CS
MOV     BP,[BX+DI]
ADD     DH,BL
DB      62
POP     DX
SUB     [BX+SI+EA20],DH
AND     [BX+SI],CH
POP     CS
CMP     [SI],BP
POP     CS
SUB     BYTE PTR [BX+DI],00
OUT     DX,AL
DB      62
DB      64
SUB     [BX+SI+EA20],DH
AND     [BX+SI],CH
POP     CS
AND     AL,2C
POP     CS
SUB     BYTE PTR [BX+DI],00
JMP     [BP+SI+6E]
SUB     [BX+SI+EA20],DH
AND     [BX+SI],CH
POP     CS
AND     AL,2C
POP     CS
DB      6F
SUB     [BX+SI],AX
PUSH    CS
DB      63
JS      51DD
MOV     AL,20
JMP     180F:2820
SUB     AL,0F
DB      69
SUB     [BX+SI],AX
PUSH    DS
DB      63
SUB     BYTE PTR [BX+SI],B0
AND     DL,CH
AND     [BX+SI],CH
POP     CS
SBB     [SI],CH
POP     CS
PUSH    CX
SUB     [BX+SI],AX
CS:
DB      63
MOV     [BX+SI],CS
MOV     AL,20
JMP     240F:2820
SUB     AL,0F
PUSH    CX
SUB     [BX+SI],AX
DS:
DB      63
XCHG    SI,AX
SUB     [BX+SI+EA20],DH
AND     [BX+SI],CH
POP     CS
AND     AL,2C
POP     CS
AND     CH,[BX+DI]
ADD     [BP+63],CL
MOV     AL,[8228]
AND     [BX+DI+20],CL
OUT     20,AX
ADC     AH,[BX+SI]
INT     3
AND     [BX+DI],BL
ADD     [BP+DI+63],BL
STOSB
SUB     [SI+59],CL
OUT     4C,AX
POP     CX
JMP     621C
ADD     [BX+DI+63],BH
SCASW
SUB     [BP+DI+4C20],CL
POP     CX
OUT     0F,AX
DAS
AND     BH,CH
AND     [SI+59],CL
OUT     0F,AX
PUSH    DI
AND     CH,CL
AND     [SI+59],CL
OUT     4C,AX
POP     CX
JMP     5245
XCHG    BX,AX
DB      63
MOV     AH,28
MOV     AL,28
POP     CS
DB      C0
SUB     AL,4C
POP     CX
SUB     DX,BP
SUB     [BX],CL
INT     3
SUB     AL,4C
POP     CX
JMP     7B5B
SUB     AL,2C
INC     DX
ADD     [DI+B963],AH
SUB     [BP+DI+4920],CL
OUT     19,AX
AND     CH,CL
AND     [BX+DI+0E20],CL
DB      C8
SUB     [BX+SI],AL
MOV     SP,BE63
SUB     DH,BH
POP     [BX+SI]
IRET
AND     [BX+SI],CH
JMP     12EA:2C12
SUB     [SI],BP
PUSH    AX
```

```
AND     AL,28
DEC     CX
SUB     [BX+SI],AX
LES     SP,[BP+DI-38]
SUB     [BP+DI+4920],AL
ADD     DL,AH
DB      63
SHR     BYTE PTR [BX+SI],CL
CMP     CL,[BX+50D9]
PUSH    DX
DEC     CX
DEC     SI
PUSH    SP
AND     [BX+DI+52],AL
PUSH    DX
INC     CX
POP     CX
AND     [BX+46],CL
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
PUSH    BX
ADD     CH,CH
DB      63
FSUBR   QWORD PTR [BX+SI]
RETF    1320
SUB     AL,0F
SBB     AX,[BX+SI]
ADD     [SI-1A],SP
SUB     [BX+DI+2220],DL
PUSH    DX
INC     BP
PUSH    BX
DEC     CX
INC     SP
INC     BP
DEC     SI
PUSH    SP
DEC     CX
INC     CX
DEC     SP
AND     AL,[BX+SI]
OR      AL,64
LOCK
SUB     DL,CL
AND     [BX+SI],BL
SUB     AL,0F
SBB     AX,[BX+SI]
POP     DS
DB      64
CLI
SUB     [BX+DI+2220],DL
INC     BX
DEC     DI
DEC     BP
DEC     BP
INC     BP
PUSH    DX
INC     BX
DEC     CX
INC     CX
DEC     SP
AND     AL,[BX+SI]
DAS
DB      64
ADD     AL,29
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX+DI],BL
ADD     [BP+DI],BH
DB      64
PUSH    CS
SUB     [SI+58],CX
OUT     4C,AX
POP     AX
JMP     5301
POP     AX
DB      64
ADC     BP,[BX+DI]
MOV     SP,[BX+SI]
DEC     SP
POP     AX
OUT     18,AX
AND     BH,CH
AND     [SI+58],CL
OUT     0F,AX
OR      AL,20
INT     20
DEC     SP
POP     AX
OUT     4C,AX
POP     AX
JMP     531D
DB      64
DB      64
SBB     [BX+DI],CH
RETF    4C20
POP     AX
SUB     AL,0F
SBB     AX,[BX+SI]
JNZ     537D
AND     CH,[BX+DI]
XCHG    CX,AX
AND     [BP+DI+48],AL
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     AL,28
DEC     CX
SUB     [BX+SI],AX
JGE     538E
SUB     AL,29
AND     WORD PTR [BX+SI],+49
ADD     [SI+3664],DL
SUB     [BP+SI],DI
POP     CX
PUSH    SI
INC     CX
INC     BX
INC     CX
DEC     SI
INC     BX
POP     CX
AND     [BX+DI+4E],AL
INC     SP
AND     [BX+SI+4F],DL
PUSH    AX
ADD     [BX+SI+4064],AH
SUB     DX,CX
AND     [BX],CL
ADC     AX,0F2C
SBB     [BX+SI],AX
MOV     CH,64
DEC     DX
SUB     [BX+DI+5620],DX
INC     BX
CMP     SP,[BP+SI]
AND     AX,5620
INC     CX
INC     BX
INC     CX
DEC     SI
INC     BX
POP     CX
AND     AL,[BX+SI]
DB      C1
DB      64
PUSH    SP
SUB     DX,CX
AND     [BX],CL
POP     SS
SUB     AL,0F
SBB     [BX+SI],AX
FSUB    DWORD PTR [SI+5E]
SUB     [BX+DI+FF20],DX
TEST    [BX+SI],BP
PUSH    AX
DEC     DI
PUSH    AX
SUB     [BP+DI],DI
AND     [BP+SI],AH
AND     [BX+SI+4F],DL
PUSH    AX
CS:
AND     AL,[BX+SI]
DB      F1
DB      64
JL      53B8
CMP     CL,[BX+4ED9]
PUSH    BP
DEC     BP
INC     DX
INC     BP
PUSH    DX
PUSH    BX
AND     [4C20],AH
INC     BP
PUSH    SP
PUSH    SP
INC     BP
PUSH    DX
PUSH    BX
ADD     CL,BH
DB      64
XCHG    [BX+DI],CH
DEC     BX
OUT     11,AX
ADD     [SI],CL
DB      65
NOP
SUB     [BP+SI+4920],AX
OUT     14,AX
AND     AH,CL
AND     [BX],CL
POP     SS
AND     BH,CL
AND     [BP+DI],DL
ADD     [9A65],DL
SUB     [BP+DI-19],CX
DEC     BX
JMP     53DB
AND     [DI-5C],AH
SUB     DX,CX
AND     [BX+DI+2C],CL
ADC     AL,[BX+SI]
DAS
DB      65
MOV     AX,9129
AND     [BX+52],AL
DEC     CX
INC     SP
AND     AL,28
DEC     BX
SUB     [BX+SI],AX
AAA
DB      65
RET     8329
AND     [BX+DI+00],CL
INC     CX
DB      65
INT     3
SUB     DX,CX
AND     [BP+SI],DL
SUB     AL,12
ADD     [BX+DI+65],AH
DB      D6
SUB     [BX+DI+2220],DX
AND     [BX+SI],AH
AND     [BX+DI+42],AL
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AND     [BP+DI+44],AL
AND     [DI+46],AL
AND     [BX+48],AL
AND     [BX+DI+4A],CL
AND     [BP+DI+4C],CL
AND     [DI+4E],CL
AND     AL,[BX+SI]
DB      6C
DB      65
LOOPNZ  5441
RETF    0F20
SBB     [SI],CH
ADC     AL,[BX+SI]
MOV     AH,[DI-16]
SUB     [BP+DI+5320],CX
PUSH    DI
XOR     DH,[BX+SI]
OUT     12,AX
AND     DH,CH
AND     [BP+43],DL
AND     DH,AH
AND     [DI],DL
AND     CH,CL
AND     [DI+0E20],CL
MOV     AL,36
ADD     [DI+1265],BL
SUB     BH,[BP+SI]
POP     CX
PUSH    SP
DEC     CX
DEC     SP
INC     BP
AND     [BX+DI+4E],CL
AND     [DI+41],CL
PUSH    AX
ADD     [BP+1C65],CH
SUB     AL,[BP+SI+4920]
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AX,[BX+SI]
MOV     BP,2665
SUB     AL,[BP+SI+4A20]
OUT     12,AX
AND     AH,CL
AND     [BX],CL
PUSH    CS
ADD     CL,BL
DB      65
SUB     BP,[BP+SI]
MOV     SP,[BX+SI]
PUSH    SP
AND     AL,28
DEC     CX
SUB     AL,4A
SUB     DI,SP
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
AND     CH,CL
AND     [BX+DI+0E20],CL
CMP     CH,[BP+SI]
ADD     [BX+SI],AL
DB      66
XOR     [BP+SI],CH
DEC     BYTE PTR [BX+2820]
POP     AX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,54
AND     AL,28
DEC     CX
SUB     AL,4A
SUB     [SI],BP
ADC     AL,00
OR      [BP+3A],AH
SUB     AL,[BP+DI+4A20]
ADD     [BX+SI],DL
DB      66
INC     SP
SUB     AL,[BP+DI+4920]
ADD     [BP+SI],BH
DB      66
DEC     CX
SUB     CL,[BP+DI+4720]
DEC     BP
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     BH,AH
AND     [BX+DI],DL
AND     DH,CH
AND     [BP+DI+57],DL
XOR     DH,[BX+SI]
OUT     11,AX
AND     CH,CL
AND     [DI+0E20],CL
CLC
SUB     BH,[BP+SI]
MOV     [BX+SI],SP
PUSH    CS
POP     AX
SUB     AL,[BX+SI]
DB      66
DB      66
DEC     DX
SUB     CL,[BP+DI+4720]
DEC     BP
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     BH,AH
AND     [BX+DI],DL
AND     DH,CH
AND     [BP+DI+57],DL
XOR     DH,[BX+SI]
AND     BH,AH
AND     [BP+SI],DL
AND     CH,CL
AND     [DI+0E20],CL
IN      AL,DX
SUB     AL,3A
MOV     [BX+SI],SP
PUSH    CS
POP     AX
SUB     AL,[BX+SI]
TEST    [BP+4E],SP
SUB     AL,[DI+2220]
PUSH    AX
PUSH    DX
INC     BP
PUSH    BX
PUSH    BX
AND     [DI+4E],AL
PUSH    SP
INC     BP
PUSH    DX
AND     [BP+4F],AL
PUSH    DX
AND     [DI+45],CL
DEC     SI
PUSH    BP
AND     CH,[SI]
INC     CX
ADD     [BX+SI+5366],AH
SUB     CL,[BP+DI+4720]
DEC     BP
INC     BX
DEC     AX
DEC     DI
DEC     CX
INC     BX
INC     BP
AND     BH,AH
AND     [BX+DI],DL
AND     CH,CL
AND     [DI+0E20],CL
CLC
SUB     AL,[BX+SI]
CMPSB
DB      66
POP     AX
SUB     AL,AL
ADD     [BP+6266],CH
SUB     CL,AL
AND     [BX+DI],DL
ADD     [BX+6C66],DH
SUB     AH,[BX+SI+0F20]
PUSH    AX
ADD     [DI+7666],BH
SUB     CL,[BP+C800]
DB      66
CLC
SUB     CL,DL
AND     [BX],CL
SBB     [SI],CH
ADC     AL,[BX+SI]
MUL     BYTE PTR [BP+02]
SUB     AX,[DI+2220]
XOR     AX,5920
INC     BP
INC     CX
PUSH    DX
PUSH    BX
AND     [BX+DI+4E],CL
AND     [SI+48],DL
INC     BP
AND     [BP+55],AL
PUSH    SP
PUSH    BP
PUSH    DX
INC     BP
AND     [DI],CH
AND     [BX+SI+52],DL
INC     BP
PUSH    BX
PUSH    BX
AND     [DI+4E],AL
PUSH    SP
INC     BP
PUSH    DX
AND     CH,[SI]
INC     CX
ADD     AH,BH
DB      66
OR      AL,2B
MOV     ES,[BX+SI]
PUSH    CS
DB      67
IN      AL,DX
SUB     AL,8F
AND     [BP+SI],DH
XOR     AX,5920
INC     BP
INC     CX
PUSH    DX
```

```
AND     [DI+41],CL
PUSH    AX
ADD     [BP+DI],AH
DB      67
IMUL    BYTE PTR [SI]
POP     [BX+SI]
PUSH    SP
DEC     CX
DEC     SP
INC     BP
AND     [BX+DI+4E],CL
AND     [BP+SI+4C],AL
INC     CX
INC     BX
DEC     BX
PUSH    BX
ADD     [SI],DH
DB      67
ADD     [DI],CH
AND     BYTE PTR [BX+SI],49
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
OR      AX,[BX+SI]
INC     BP
DB      67
OR      CH,[DI]
AND     BYTE PTR [BX+SI],4A
AND     BH,AH
AND     [BP+SI],DL
AND     AH,CL
AND     [BX],CL
PUSH    CS
ADD     [BP+SI+67],DH
POP     CS
SUB     AX,208B
SUB     [BX+DI-1A],CL
OUT     17,AX
AND     DH,CH
AND     [BX+DI+20],CL
CALL    76F2
SBB     CH,[BX+DI]
AND     DH,CH
AND     [BX+SI],CH
DEC     DX
OUT     E7,AL
SBB     [BX+SI],AH
OUT     DX,AL
AND     [BP+SI-18],CL
OUT     1A,AX
SUB     BP,CX
AND     [BX+DI+0E20],CL
PUSH    DS
SUB     AX,9000
DB      67
ADC     AL,2D
MOV     SP,[BX+SI]
PUSH    SP
AND     AL,28
DEC     CX
SUB     AL,4A
SUB     [BX+SI],SP
OUT     20,AX
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
AND     CH,CL
AND     [DI+0E20],CL
CBW
CMP     AL,[BX+SI]
CBW
DB      67
PUSH    DS
SUB     AX,2083
DEC     DX
ADD     [BX+SI+2867],AH
SUB     AX,2083
DEC     CX
ADD     DH,AL
DB      67
XOR     CH,[DI]
POP     [BX+SI]
PUSH    AX
INC     CX
DEC     CX
DEC     SI
PUSH    SP
AND     [BX+DI+4E],CL
AND     [DI+58],AL
PUSH    SP
PUSH    DX
INC     CX
AND     [BX+SI+41],DL
PUSH    DX
PUSH    SP
PUSH    BX
AND     [BX+49],DL
PUSH    SP
DEC     AX
AND     [BP+DI+45],DL
INC     BP
INC     SP
PUSH    BX
ADD     BL,CH
DB      67
LOOPNZ  56AB
MOV     SP,[BX+SI]
PUSH    SP
DEC     CX
INC     BP
AND     BH,AH
AND     [BP+SI],DL
AND     CH,CL
AND     [BP+43],DL
AND     BH,AH
AND     [DI],DL
AND     [BP+SI],BH
MOV     AX,[5620]
INC     BX
AND     BH,AH
AND     [BP+43],DL
AND     CL,CH
ADC     AL,[BX+SI]
MUL     WORD PTR [BX-16]
CS:
RETF    0F20
ADC     AX,0F2C
SBB     [BX+SI],AX
ADD     [BX+SI-0C],CH
CS:
XCHG    CX,AX
AND     [BP+43],DL
ADD     [BX+DI],DL
DB      68
JMP     FAR [2082]
DEC     CX
AND     BH,AH
AND     [CC20],DL
AND     [BX],CL
ADC     AL,00
DAA
DB      68
OR      [BX],CH
PUSH    AX
DEC     DI
PUSH    AX
AND     BH,AH
AND     [BX+SI+4F],DL
PUSH    AX
AND     BL,CH
AND     [DI],BL
POP     SP
POP     [BP+SI]
ADD     WORD PTR [BX+SI],6
ADC     CH,[BX]
AND     WORD PTR [BX+SI],+49
ADD     [BP+DI],BH
DB      68
SBB     AL,2F
RETF    0F20
POP     SS
SUB     AL,0F
SBB     [BX+SI],AX
PUSH    CX
DB      68
ES:
DAS
XCHG    CX,AX
AND     BH,BH
TEST    [BX+SI],BP
PUSH    AX
DEC     DI
PUSH    AX
SUB     [BP+DI],DI
AND     AH,[BX+SI]
PUSH    AX
DEC     DI
PUSH    AX
CS:
AND     AL,[BX+SI]
POP     SP
DB      68
XOR     [BX],CH
RETF    0F20
SBB     [SI],CH
ADC     AL,[BX+SI]
MOV     BP,[BX+SI+3A]
DAS
TEST    [BX+SI],SP
AND     DH,[BP+SI]
XOR     [BX+SI],AH
POP     CX
INC     BP
INC     CX
PUSH    DX
PUSH    BX
AND     [BX+DI+4E],CL
AND     [SI+48],DL
INC     BP
AND     [BP+55],AL
PUSH    SP
PUSH    BP
PUSH    DX
INC     BP
AND     [DI],CH
AND     [BX+SI+52],DL
INC     BP
PUSH    BX
PUSH    BX
AND     [DI+4E],AL
PUSH    SP
INC     BP
PUSH    DX
AND     CH,[SI]
INC     CX
ADD     [BX+DI+4468],DL
DAS
MOV     ES,[BX+SI]
MOV     BH,68
MOV     AL,36
POP     [BX+SI]
INC     BX
DEC     AX
INC     CX
DEC     SI
INC     DI
INC     BP
AND     [SI+49],DL
DEC     SP
INC     BP
PUSH    BX
AND     [BX+DI+4E],CL
AND     [BP+DI+45],AL
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DEC     SI
PUSH    SP
INC     BP
PUSH    DX
AND     [SI+4F],DL
AND     [BP+SI+4C],AL
INC     CX
INC     BX
DEC     BX
ADD     BL,CL
DB      68
MOV     DX,5436
AND     AL,28
SBB     [SI],CH
SBB     CH,[BX+DI]
AND     BH,AH
AND     [BX+SI+24],DL
SUB     [BX+DI],BL
SUB     [BX+SI],AX
FILD    QWORD PTR [BX+SI-3C]
SS:
PUSH    SP
AND     AL,28
SBB     [SI],BP
SBB     [BX+DI],BP
AND     BH,AH
AND     [BX+SI+24],DL
SUB     [BX+DI],BL
SUB     [BX+SI],AX
REPZ
DB      68
INTO
SS:
PUSH    SP
AND     AL,28
SBB     CH,[SI]
SBB     [BX+DI],BP
AND     BH,AH
AND     [BX+SI+24],DL
SUB     [BX+DI],BL
SUB     [BX+SI],AX
POP     ES
DB      69
FDIV    DWORD PTR [2454]
SUB     [BX],DL
SUB     AL,18
SUB     [BX+SI],SP
OUT     20,AX
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
ADD     [BP+DI],BL
DB      69
LOOP    57F4
PUSH    SP
AND     AL,28
SBB     [SI],BP
SBB     [BX+DI],CH
AND     BH,AH
AND     [BX+SI+24],DL
SUB     [BX+DI],BL
SUB     [BX+SI],AX
DAS
DB      69
IN      AL,DX
SS:
PUSH    SP
AND     AL,28
SBB     [SI],BP
SBB     CH,[BX+DI]
AND     BH,AH
AND     [BX+SI+24],DL
SUB     [BX+DI],BL
SUB     [BX+SI],AX
INC     BX
DB      69
DB      F1
SS:
PUSH    SP
AND     AL,28
SBB     [SI],CH
SBB     [BX+DI],BP
AND     BH,AH
AND     [BX+SI+24],DL
SUB     [BX+DI],BL
SUB     [BX+SI],AX
DEC     CX
DB      69
DIV     BYTE PTR [008E]
DB      6D
DB      69
CBW
CMP     CL,[BX+5020]
INC     CX
DEC     CX
DEC     SI
PUSH    SP
AND     [BX+DI+4E],CL
AND     [BX+DI+4E],CL
INC     SP
DEC     CX
PUSH    SI
DEC     CX
INC     SP
PUSH    BP
INC     CX
DEC     SP
AND     [DI+4E],AL
INC     SP
AND     [BP+DI+45],AL
DEC     SP
DEC     SP
PUSH    BX
ADD     [DI+A269],AH
CMP     CL,[BP+DI+4920]
AND     BH,AH
AND     [BP+SI],DL
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
POP     CS
OR      AL,20
INT     20
DEC     BYTE PTR [BX+2820]
POP     AX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     AL,29
SUB     AL,14
ADD     CH,BL
DB      69
LODSB
CMP     CL,[BP+DI+4920]
AND     BH,AH
AND     [BP+DI],DL
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
POP     CS
OR      AL,20
INT     20
DEC     BYTE PTR [BX+2820]
POP     AX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     AL,29
SUB     AL,14
ADD     [DI],DL
DB      6A
MOV     DH,3A
MOV     SP,[BX+SI]
DEC     CX
AND     BH,AH
AND     [SI],DL
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
POP     CS
OR      AL,20
INT     20
DEC     BYTE PTR [BX+2820]
POP     AX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
PUSH    SS
SUB     [SI],BP
ADC     AL,00
DEC     BP
DB      6A
DB      C0
CMP     CL,[BP+DI+4920]
AND     BH,AH
AND     [BP+SI],DL
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
POP     CS
OR      AX,CD20
AND     DH,BH
POP     [BX+SI]
SUB     [BX+SI+4D],BL
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
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ADC     AL,29
SUB     AL,14
ADD     [DI+CA6A],AL
CMP     CL,[BP+DI+4920]
AND     BH,AH
AND     [BP+SI],DL
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
POP     CS
PUSH    CS
AND     CH,CL
AND     DH,BH
POP     [BX+SI]
SUB     [BX+SI+4D],BL
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     AL,29
SUB     AL,14
ADD     [SI+D46A],BH
CMP     CL,[BP+DI+4920]
AND     BH,AH
AND     [SI],DL
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
SBB     [BX+SI],SP
INT     20
DEC     BYTE PTR [BX+2820]
POP     AX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     AL,29
SUB     AL,14
ADD     AH,DH
DB      6A
FIDIVR  WORD PTR [BP+SI]
MOV     SP,[BX+SI]
DEC     CX
AND     BH,AH
AND     [SI],DL
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
POP     CS
OR      SP,[BX+SI]
INT     20
DEC     BYTE PTR [BX+2820]
POP     AX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     AL,29
SUB     AL,14
ADD     [SI],CH
DB      6B
CALL    E4E6
AND     [BX+DI+20],CL
OUT     20,AX
POP     SS
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
POP     CS
OR      AL,20
INT     20
DEC     BYTE PTR [BX+2820]
POP     AX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     AL,29
SUB     AL,14
ADD     [SI+6B],AH
CLD
CMP     CL,[BP+DI+4920]
AND     BH,AH
AND     [BX],DL
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
POP     CS
OR      AX,CD20
AND     DH,BH
POP     [BX+SI]
SUB     [BX+SI+4D],BL
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     AL,29
SUB     AL,14
ADD     [SI+066B],BL
CMP     CX,[BP+DI+4920]
AND     BH,AH
AND     [BX],DL
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
POP     CS
PUSH    CS
AND     CH,CL
AND     DH,BH
POP     [BX+SI]
SUB     [BX+SI+4D],BL
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     AL,29
SUB     AL,14
ADD     BL,DL
DB      6B
ADC     [BP+DI],BH
MOV     SP,[BX+SI]
DEC     CX
AND     BH,AH
AND     [SI],DL
AND     DH,CH
AND     [BP+SI+20],CL
OUT     20,AX
ADC     AH,[BX+SI]
INT     20
DEC     BYTE PTR [BX+2820]
POP     AX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     AL,29
SUB     AL,14
ADD     [BP+DI],CL
DB      6C
SBB     BH,[BP+DI]
MOV     SP,[BX+SI]
DEC     CX
AND     BH,AH
AND     [BX],CL
OR      SP,[BX+SI]
OUT     DX,AL
AND     [BP+SI+20],CL
OUT     20,AX
ADC     AH,[BX+SI]
INT     20
DEC     BYTE PTR [BX+2820]
POP     AX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
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INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     AL,29
SUB     AL,14
ADD     [SI+6C],AL
AND     AL,3B
MOV     SP,[BX+SI]
PUSH    SP
AND     AL,28
DEC     CX
SUB     AL,4A
SUB     [BX+SI],SP
OUT     20,AX
PUSH    AX
AND     AL,28
SBB     [BX+DI],BP
AND     CH,CL
AND     DH,BH
POP     [BX+SI]
SUB     [BX+SI+4D],BL
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [SI],BP
POP     CX
DEC     BP
INC     CX
PUSH    AX
SUB     [BX+DI+2C],CL
DEC     DX
SUB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+DI+6C],BL
SUB     [BP+DI],DI
MOV     SP,[BX+SI]
PUSH    SI
INC     BX
AND     DH,AH
AND     [CD20],DL
AND     [BX+DI+0E20],CL
DB      F1
CMP     AX,[BX+SI]
JO      5B7A
CS:
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
AND     BP,[SI]
POP     CS
POP     DS
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+336C],AL
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
AND     [SI],BP
POP     CS
DAS
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BP+386C],BL
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
AND     [SI],BP
POP     CS
AAS
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [DI+3D6C],DH
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
AND     [SI],BP
POP     CS
DEC     BX
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     AH,CL
DB      6C
INC     DX
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
POP     SS
SUB     AL,0F
DEC     BX
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     BL,AH
DB      6C
INC     DI
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
ADC     AL,2C
POP     CS
POP     DI
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     DL,BH
DB      6C
DEC     SP
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
AND     [SI],BP
POP     CS
JNB     5BCD
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+DI],DL
DB      6D
PUSH    CX
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
ES:
SUB     AL,0F
TEST    [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+SI],CH
DB      6D
PUSH    SI
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
XOR     [SI],CH
POP     CS
TEST    [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+SI+6D],AL
POP     BX
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
AAS
SUB     AL,0F
XCHG    BP,AX
SUB     [SI],BP
AND     [BX+SI+24],DL
SUB     [BP+SI],DL
SUB     [SI],BP
ADC     AL,00
PUSH    DI
DB      6D
DB      60
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
DEC     CX
SUB     AL,0F
XCHG    BP,AX
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BP+6D],CH
DB      6A
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
PUSH    BX
SUB     AL,0F
XCHG    BP,AX
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [DI+6F6D],AL
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
DB      63
SUB     AL,0F
MOV     AH,29
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [SI+746D],BL
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
DB      6F
SUB     AL,0F
MOV     AX,[2C29]
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BP+DI+796D],DH
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
POP     [SI]
```

```
POP     CS
POP     [BX+DI]
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     DL,CL
DB      6D
JLE     5CA5
DEC     BYTE PTR [BX+2820]
POP     CS
STOSW
SUB     AL,0F
DB      6F
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     CL,AH
DB      6D
CMP     WORD PTR [BP+DI],-02
POP     [BX+SI]
SUB     [BX],CL
MOVSW
SUB     AL,0F
DB      65
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     AL,BH
DB      6D
MOV     [BP+DI],BH
DEC     BYTE PTR [BX+2820]
POP     CS
WAIT
SUB     AL,0F
POP     DI
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX],CL
DB      6E
LEA     DI,[BP+DI]
DEC     BYTE PTR [BX+2820]
POP     CS
WAIT
SUB     AL,0F
PUSH    SI
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [DI],AH
DB      6E
XCHG    DX,AX
CMP     DI,SI
POP     [BX+SI]
POP     CS
STOSW
SUB     AL,0F
PUSH    SI
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [SI],BH
DB      6E
XCHG    DI,AX
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
MOV     AH,2C
POP     CS
PUSH    SI
SUB     [SI],BP
PUSH    AX
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BP+DI+6E],DL
PUSHF
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
MOV     AH,2C
POP     CS
SBB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BP+SI+6E],CH
MOV     AX,[FE3B]
POP     [BX+SI]
SUB     [BX],CL
STOSW
SUB     AL,0F
SBB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+SI+A66E],AL
CMP     DI,SI
POP     [BX+SI]
POP     CS
WAIT
SUB     AL,0F
SUB     CH,[BX+DI]
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+AB6E],DL
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
XCHG    BX,AX
SUB     AL,0F
CMP     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BP+B06E],CH
CMP     DI,SI
POP     [BX+SI]
SUB     [BX],CL
SUB     WORD PTR [SI],+0F
CMP     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     CH,AL
DB      6E
MOV     CH,3B
DEC     BYTE PTR [BX+2820]
POP     CS
JS      5D98
POP     CS
CMP     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     AH,BL
DB      6E
MOV     DX,FE3B
POP     [BX+SI]
SUB     [BX],CL
DB      6F
SUB     AL,0F
CMP     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     DL,DH
DB      6E
MOV     DI,FE3B
POP     [BX+SI]
POP     CS
DB      63
SUB     AL,0F
SUB     CH,[BX+DI]
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+DI],CL
DB      6F
LES     DI,[BP+DI]
DEC     BYTE PTR [BX+2820]
POP     CS
PUSH    SI
SUB     AL,0F
SUB     CH,[BX+DI]
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+SI],AH
DB      6F
SAR     WORD PTR [BP+DI],CL
DEC     BYTE PTR [BX+2820]
POP     CS
DEC     BP
SUB     AL,0F
SUB     CH,[BX+DI]
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX],DH
DB      6F
FDIVR   DWORD PTR [BP+DI]
DEC     BYTE PTR [BX+2820]
POP     CS
DEC     BP
SUB     AL,0F
AND     BP,[BX+DI]
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BP+6F],CL
FSTSW   [BP+DI]
DEC     BYTE PTR [BX+2820]
POP     CS
DEC     BX
SUB     AL,0F
OR      BP,[BX+DI]
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [SI+6F],AH
LOOP    5E40
DEC     BYTE PTR [BX+0F28]
CMP     AL,2C
POP     CS
OR      CH,[BX+DI]
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
```

```
ADD     [BP+DI+6F],BH
OUT     3B,AX
DEC     BYTE PTR [BX+2820]
POP     CS
PUSH    AX
SUB     AL,0F
SBB     AL,29
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+DI+EC6F],DL
CMP     DI,SI
POP     [BX+SI]
POP     CS
DAS
SUB     AL,0F
SBB     [BX+DI],BP
SUB     AL,50
AND     AL,28
ADC     CH,[BX+DI]
SUB     AL,14
ADD     [BX+F16F],DL
CMP     CX,[BP+BE00]
DB      6F
REPNZ
CMP     CX,[BX+5420]
DEC     AX
DEC     CX
PUSH    BX
AND     [BX+DI+53],CL
AND     [SI+48],DL
INC     BP
AND     [BX+DI+42],AL
PUSH    BX
DEC     DI
DEC     SP
PUSH    BP
PUSH    SP
INC     BP
AND     [DI+4E],AL
INC     SP
AND     [BX+46],CL
AND     [BP+SI+4F],AL
POP     DX
DEC     DI
```

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BIOGRAPHICAL SKETCH

Susan Elshaw Thrall was born and raised in Ohio. She attended College of Mount Saint Joseph-on-the-Ohio from 1965 to 1969 and received a Bachelor of Arts magna cum laude in history and German in May, 1969.

She attended The Ohio State University from 1969 to 1972 and from 1973 to 1975. During that time she pursued studies in German and secondary education. She received an M.A. degree in German in December, 1970 and an Ohio Teacher's Certificate in social studies and German in 1975. Since that time she has pursued graduate courses in geography at the University of Florida and courses in mathematics and computer science at McMaster University in Canada and State University of New York at Buffalo.

She has been involved in professional education for over fifteen years and has taught at the university, secondary, and elementary levels. She has taught both in the United States and Canada. Subjects she has taught include geography and other social studies, mathematics, German, and computer science.

She has published a book in computer education entitled Teacher's Guide to the Commodore Computer: BASIC Programming and Classroom Applications. She has also presented papers on educational geographic computer

applications and computer technology to various professional organizations, including the National Council of Geographic Educators.

Currently she is an instructor of computer science at Lake City Community College where she teaches computer languages, including Pascal, FORTRAN, Assembly, COBOL, and BASIC, and various computer applications. She is also Coordinator of the Computer Science program at Lake City Community College.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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